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CONTENTS

	PAGE
Editorial Notes	169
The Transport Act, 1947	171
The Economic Crisis and Transport	171
Increased Railway Charges	172
The Pullman Transfer Complete	173
Locomotive Running-Shed Practice	173
Letters to the Editor	174
The Scrap Heap	175
Overseas Railway Affairs	176
Strengthening of Railway Bridges in Palestine	177
Electric Traction Section	178
Battery Locomotives of London Transport	178
Electrification Plans in Italy	180
L.M.S.R. Permanent Way Developments—3	181
Railway Assistance for Hydro-Electric Scheme	183
Mobile V.H.F. Radio Equipment	184
A New Lightweight Shunting Unit	186
Personal	187
Accidents on British Railways, 1946	189
Ministry of Transport Accident Report	190
L.N.E.R. Third Class Sleeper with Single- and Double-Berth Compartments	192
Parliamentary Notes	193
Notes and News	194
Official Notices	195
Stock Market and Table	196

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THE RAILWAY GAZETTE

33, TOTHILL STREET, WESTMINSTER, S.W.1.

Railway Equipment Suppliers and the Crisis

THE effects of the growing industrial crisis so far as concerns transport directly are dealt with elsewhere in this issue. One aspect which so far has not attracted great attention, however, has been the position of a number of important railway equipment suppliers under the dual threats of increasing State control of the iron and steel industry, and the onset of industrial recession. Suppliers of locomotives, rails, wagons, carriages, signalling, and other railway equipment are sections of the iron and steel trades which benefit from increased production of coal and raw and semi-finished materials, which presumably must form the basic part of any Government plan to deal with the difficulties which now beset the country; and also they seem reasonably assured of escape from State control. A recent leading article in *The Financial Times* pointed out that railway suppliers have the further advantage of high priority in such plans as the Government has made. That newspaper pointed out that the current trading position of the industry is encouraging, and that the recovery from the effects of the fuel crisis has been speedy.

* * * *

European Railway Officers in India

We are not surprised to learn that acute disappointment prevails among the 338 European railway officers in India, referred to on pages 89-90 in our issue of July 25, as a result of the Commons debate on the Indian Independence Bill, important details of which may have escaped general notice. For the Under-Secretary of State, though he assured the House that the Government intended to safeguard the interests of these officers in the treaty to be negotiated with the successor Governments in India, made it clear that they were not included in the "analogous services" for which the Prime Minister pledged his Government's responsibility. This statement was in reply to a strongly-worded appeal by Sir John Anderson, urging the House to recognise frankly a continuing moral responsibility towards these officers, to whom "there ought to be assurances given by His Majesty's Government, with the approval of Parliament." We trust that the agreement of the new Dominion Governments will be speedily obtained to the provision of sterling cover for the provident fund and other dues of these officers, and we again urge His Majesty's Government to reassure them by accepting full responsibility for their future general well-being.

* * * *

Indian Pre-War and Post-War Statistics

A striking comparison between Indian railways' pre-war and post-war statistics is to be found in the latest annual administration report—for 1945-46—published by the Railway Board. Some of the more interesting figures are tabulated below, with British currency substituted for Indian. They are compiled from returns from all Indian railways of all classes and gauges; except in the case of the pence, all are in millions.

Items	1938-39	1945-46
Gross earnings	£80·36	£182·69
Working expenses	£53·39	£127·01
Number of passengers originating	530·62	1,044·34
Passenger-miles	18,742·79	41,335·77
,, earnings	£23·05	£65·06
Average earnings per passenger-mile	0·295d.	0·378d.
Freight tons originating	88·36	100·63
Freight ton-miles	22,158·84	29,166·45
Freight earnings	£51·43	£87·24
Average earnings per freight ton-mile	0·561d.	0·718d.
Total train-miles	197·04	190·15

It will be seen, therefore, that in 1945-46 gross earnings were over 2¼ times what they were in 1938-39, and that working expenses rose by 138 per cent. during these seven years, and passenger-miles by about 120 per cent. Also, that, although the passenger-mileage increased by 22,592,980,000 and freight ton-mileage by 7,007,610,000, train-mileage decreased by 6,890,000, a remarkable achievement.

* * * *

Accidents on British Railways in 1946

The annual report for 1946 of Lt.-Colonel Sir Alan Mount, C.E., C.B.E., Chief Inspecting Officer of Railways, Ministry of Transport, is summarised elsewhere in this issue. In accordance with our custom, we shall be dealing with the report at greater length in a subsequent issue. Train accidents during 1946 resulted in the deaths of 34 passengers and 9 railway

servants; the fatality rate amongst passengers was one in nearly 1,000 million miles of travel. Total train accidents of all kinds numbered 1,237, of which human failure accounted for 526, and defective rolling stock, track, or apparatus, for 180. Fatalities in all movement on rail, including train accidents, totalled 413, which is less than in any of the six previous years, and nearly 23 per cent. less than the 1941 peak of 534. The figure was still considerably higher than the pre-war average of 338 for the period 1935-39. The report points out that little, if any, headway was made during 1946 in overtaking arrears of maintenance; recovery was impeded by shortages of material and labour. Arrears of renewals of rails in running lines increased to 400,000 tons, and sleepers to 10 millions.

* * * *

Welding of Track Components on the L.M.S.R.

Brief reference was made in our issue of June 6 to the lecture on the application of welding to trackwork, by Mr. N. W. Swinnerton, Chief Civil Engineer's Department, L.M.S.R., on the occasion of the recent visit of the Permanent Way Institution to Northampton. Through the courtesy of Mr. W. K. Wallace, Chief Civil Engineer, L.M.S.R., we are able to return to the subject at greater length in this issue. Nearly 20 years have elapsed since the company made its first experiments with welded crossings, at Watford, and although some of the results were not completely successful, further experiments were carried out, to overcome the initial difficulties. Some of the early failures were due to the deposit being too hard, and to a lack of pre-heating. The wide range of the carbon and manganese contents in the steel used for rails makes it far from easy to weld, and the quenching effect of laying an electrode on to an untreated rail is liable to set up small cracks in the junction of the deposit with the parent rail. These cracks develop under traffic, and result in fatigue flaws and rail failures. A specification for arc welding was drawn up, which required the pre-heating of the rails and the use of electrodes with a definite range of hardness. These researches have yielded highly satisfactory results, which have gone far towards mitigating the task of the maintenance engineers.

* * * *

Speeding up Small Goods Traffic

To provide, as far as practicable, a quicker service for small consignments of goods-train traffic, the main-line railways are progressively introducing zonal schemes for collection and delivery. Under these schemes the country is divided into areas, and the traffic in each area, by making use of rail and road facilities, is effectively concentrated at the principal centre of each area—the railhead—and then given direct service by rail with efficient delivery at destination. The aim of the zonal scheme is to give a next day's delivery, and also to provide facilities for a collection and delivery service at places not previously served. The Southern Railway introduced its zonal scheme in the Horsham area on July 28. The Horsham collection and delivery service will embrace the following stations:—

Horsham	Partridge Green	Warnham
Christ's Hospital	Henfield	Ockley
Billingshurst	Slinfold	Holmwood
Pulborough	Rudgwick	Faygate
Southwater	Baynards	Crawley
West Grinstead	Cranleigh	Three Bridges

* * * *

L.M.S.R. Mobile Testing Plant

For many years the L.M.S.R. found that tests made under ordinary running conditions with a dynamometer car interposed between a locomotive and train, provided results of sufficient practical accuracy for design policy purposes. Eventually, a need arose for a means of working a locomotive under test, at a succession of constant speeds, each of which was to be held for an appreciable period; there was difficulty, though, in maintaining reasonably constant conditions over a sufficient time to enable reliable observations to be recorded. It was found that these difficulties could be overcome if the resistance of the train could be immediately adjusted to compensate for the effects of gradients, curves, and so on. Investigation proved that this could be achieved by using electric locomotives with rheostatic braking, having a very sensitive form of control that would maintain an exactly constant speed irrespective of changes in the drawbar pull of the engine, or the resistance of the track. For this purpose a new test train was authorised in 1936 on the L.M.S.R.; it was to consist of a special tender, dynamometer car, and three braking units. Each of these braking units was, in effect, an electric locomotive designed for braking instead of pulling, and together they gave a maximum braking effort of 23 tons; the braking units were almost complete in 1939, and after wartime use as emergency power generators, are now being reconditioned. The tender and dynamometer car are not yet complete, but tests are to be carried out meanwhile using one of the braking units and the L.M.S.R. No. 1 dynamometer car.

* * * *

The Derailment at Byfleet, Southern Railway

Colonel A. C. Trench, in his report on the derailment at Byfleet, Southern Railway, on December 27, 1946, a summary of which appears in this issue, places the responsibility on the permanent way staff for not appreciating adequately the difficulty of satisfactory maintenance of the track in the cutting south of the station under the exceptional conditions obtaining at the end of last year. Although the irregularities of cant afterwards registered were caused, or at any rate greatly accentuated, by the passage of the last preceding train—an express travelling at 65 m.p.h.—and this would have been noticeable only at the last moment, Colonel Trench cannot understand how the permanent way staff can have felt satisfied with a length of track where so many sleepers were, as was found, lacking in solid support. An interesting feature of the case was that during the hour preceding the derailment, five trains passed, two travelling faster than the derailed train, without enginemen or guards noticing anything unusual in the running. The cutting has always been known to be a wet one, although records show no particular difficulty in maintaining the line through it. A comprehensive scheme of reconstruction of the formation has been taken in hand, and improved drainage is being put in.

* * * *

London Transport Battery Locomotives

Several remarkable features of the battery locomotives which are used by the London Passenger Transport Board for permanent way maintenance and constructional work make them of special interest to electrical engineers. First, they are not battery machines alone, but are able, whenever possible, to make use of any available conductor rails. Secondly, the circuits are so arranged that battery charging takes place when the conductor rails are in use. Thirdly, for occasions when it is desired to use an external source of supply, as in some of the sheds where no conductor rails exist, a plug is fitted to enable charging to continue. Certain complications were introduced into the design owing to the fact that, whilst arrangements for multiple-unit working were considered essential, there was always the possibility that one of the locomotives, at one end of a train, might be taking current from a conductor rail, whilst the other, at the opposite end, was depending on its battery. We publish a description of these locomotives elsewhere in this issue. G.E.C. control equipment has been fitted to six of these locomotives, whilst three have the Metadyne apparatus. This device, which now is used extensively on London Transport passenger stock, was patented by J. M. Pestarini, and the British rights are held by the Metropolitan-Vickers Electrical Co. Ltd. Two articles on the Metadyne control appeared in the September 9, 1938, issue of the *Electric Traction Supplement* to *The Railway Gazette*.

* * * *

Locomotive Fuel Costs

At the present time, when the scarcity, cost, and declining quality of British coal have prompted the decision to equip over 1,200 coal-fired steam locomotives to burn oil fuel, it is of interest to note that in the United States, where oil firing has been standard practice for many years in States with indigenous oil supplies, such as California, Oklahoma, and Texas, questions are now being raised as to whether the use of oil to produce steam in a locomotive is not an unjustifiable extravagance. The *Railway Age*, which has been pressing for more accurate bases of comparing the relative costs of steam and diesel-electric working, recently published some comparative calculations based on locomotive fuel consumption

per 1,000 gross ton-miles of traffic handled. With diesel fuel oil at 6·4 cents a gal., diesel-electric fuel costs were assessed at 11·5 cents per 1,000 ton-miles; steam locomotives, using coal at $3·50 a ton, came next at 17·5 cents; oil-fired steam locomotives, with heavy fuel oil at 3 cents a gal., were a bad third at 25·5 cents per 1,000 ton-miles. Any increase in the cost of fuel, if, say, on an equal 10 per cent. basis for each type, would put diesel costs up by 1·1 cents, steam with coal firing up by 1·8 cents, and steam with oil firing up by 2·6 cents per 1,000 ton-miles, so increasing the disparity still further. Our contemporary suggests that some of the railways in the Western States which are large users of oil firing in steam locomotives would be well advised to consider the far more economical use of their oil in the internal-combustion engine.

* * * *

The Transport Act, 1947

JUST before 1 a.m. on Tuesday, August 5, the House of Commons commenced to discuss the various amendments made by the House of Lords to the Transport Bill, and after a discussion which lasted until shortly after 6 a.m., it accepted a proposal that the Minister should appoint the various Executives after consultation with the Commission, but rejected the remainder, and decided that its reasons for disagreeing with them should be communicated to the House of Lords. This was done, and on the next day the Lords again discussed the amendments.

They were then informed that the Commons disagreed with the proposal to increase the radius of operation of road hauliers from 25 to 40 miles as the limit inside which a vehicle is to be regarded as excluded from acquisition by the Commission, because this would so limit the number of undertakings to be acquired by the Commission as to place it in a position where it could not adequately perform the duties laid on it by the Bill. Also, that the Commons disagreed with the amendment increasing the operating radius of "A" and "B" licence holders from 25 to 40 miles, because it would unduly hamper the Commission in the performance of its duties, while the Lords amendment seeking to put the burden of proof on the Commission that a particular undertaking comes within the scope of the Act, was rejected by the Commons because it imposes a procedure which is both inappropriate and impracticable.

Finally, the Lords proposal that "A" and "B" licence holders should have the right of appealing to the licensing authority against what is considered to be unfair competition by the Commission was rejected by the Commons because it is inconsistent with the general scheme and intention of the Bill. After discussing the rejection of its amendments for about fifteen minutes, the House of Lords agreed not to insist on them, and the Bill received the Royal Assent the same day.

It is useful to recapitulate, therefore, that as from January 1, 1948, there will come under public ownership four main-line railways and 56 other minor railway undertakings with over 52,000 miles of single track; 1,640 miles of canals, about 580,000 requisitioned privately-owned railway wagons, and all road haulage undertakings which in 1946 were predominantly engaged in ordinary long-distance carriage for hire or reward for distances of 40 miles and upwards, with certain exceptions for specific traffics. The Commission is also empowered to order the transfer to itself or another body of road passenger transport undertakings.

The task of the Commission is so to weld these diverse methods of transport as to provide an efficient, adequate, economical, and properly integrated system of public inland transport and port facilities within Great Britain for passengers and goods, with due regard for safety, and when doing so to make such charges as to secure that, taking one year with another, its revenue is not less than sufficient to make provision for the meeting of charges properly chargeable to revenue. The Commission is undertaking this herculean task at a most critical time in the nation's history and at a time when the railway rolling stock and permanent way position is most unsatisfactory because of the inability of the railways to secure sufficient labour and materials to enable them to make any substantial inroads on the heavy arrears of maintenance and renewals which accumulated during the war. Transport, as the Prime Minister well said last week, is the conveyor belt of industry, and every one with the welfare of the nation at heart will wish the Commission success in its task; any failure would have the most unfortunate reactions on the whole of the national economic and industrial life.

The names of the whole-time members of the British Transport Commission, which are given on page 187, will meet with general approval, as they are clearly persons who have had wide experience in transport, industrial, commercial, or financial matters, or in administration or the organisation of workers as specified in the Act. The only possible criticism which can be made is that of the average age of the members, but there can be no criticism as to their wide experience.

It is a safe assumption that, in view of the transport difficulties which are expected this winter, the Commission will not seek to take any spectacular measures in January next in the direction of integrating the various forms of transport. Its initial task doubtless will be the integration of the four main-line railway organisations, and the Commission will largely stand or fall by the success which it achieves in this direction and the facilities which it is able to provide for trade and industry generally. It will be readily appreciated that the task of the Railway Executive, which will be charged with the duty of maintaining and operating the railways, will be most vital, particularly during the latter part of next winter.

The names of the members of this Executive have not yet been announced, but may be expected shortly, as a very great deal of preparatory work will have to be done before January 1 next to ensure that the railways continue to function satisfactorily. In any case, it is clear that, in view of the prevalent shortage of materials and the economic crisis, they will have a most arduous and probably thankless task during the next two or three years.

* * * *

The Economic Crisis and Transport

IN his speech in the House of Commons on August 6, the Prime Minister outlined the reasons for the economic crisis which now confronts the nation, and the measures which the Government proposes to take to remedy the position. Dealing, first, with the country's basic industries and services, he intimated that the Government had proposed to the coal miners' leaders that, while preserving the five-day week, there should be, as an emergency measure for a limited period, an extra half-hour's work daily, with the object of raising the output of deep-mined coal to at least 4 million tons a week between September 1, 1947, and April 30, 1948, together with as much opencast coal as could be secured.

Next in importance, he said, was steel, the production of which should reach 12½ million ingot tons during 1947, but for which the Government proposed to set a target of 14 million tons for 1948.

Turning to transport, the Prime Minister mentioned that the increased production would throw an additional strain on the transport system which had been heavily handicapped by depleted rolling stock and lack of repairs and maintenance during the war years. The Government had, therefore, he said, in the forefront of its mind the necessity of providing the transport industry with the resources it needed to enable it to overtake arrears and meet the proposed additional strain. He emphasised that we must not fail to move all the coal which could be produced, and recognised that this would involve reductions in passenger services and in the movement of other freight traffic. With this object in mind the Government was closely examining the question of the traffics which should have priority at all times, and what traffic should be next in order of acceptance, but until the shortage of wagons had been overcome, some restrictions on the acceptance of traffic would be inevitable.

The Prime Minister stated that the Government wished to supply more engines and more wagons, and that plans had been developed and enforced under which materials are delivered and labour is found to speed up the construction and repair of transport equipment. Finally, he urged traders and industrial firms to assist in reducing the turn-round time of wagons at the terminals, and asked all transport workers to repeat their achievements in the war by ensuring that transport did not fail the nation in its need.

There is no doubt that traders and transport workers will respond to this national call for help, but it cannot be emphasised too strongly that, unless an adequate supply of

materials is quickly afforded the railways for the repair of rolling stock, it will be extremely difficult for them to meet the requirements of trade and industry during the winter. The fact is that, notwithstanding the special efforts which have been made during the last twelve months to overtake some of the arrears of maintenance of railway rolling stock, the inadequate supply of materials and labour has resulted in there being fewer locomotives and wagons available for traffic than there were a year ago.

The coal production target of 200 million tons announced by the Government during the Spring would have fully taxed the railway resources during the coming winter months, when operating conditions are more difficult than in the summer, but, because the output in the summer months did not reach expectations, appreciably heavier production will be necessary during the winter if the desired target is to be reached. Although the railways no doubt will be able to deal with the anticipated additional coal, the shortage of wagons inevitably will cause the imposition of restrictions on the acceptance of certain non-essential traffics. Further, the conveyance of the additional coal which should result from the increased hours it is suggested the miners should work, will accentuate the railway difficulties and, as the Prime Minister suggests, mean further restrictions on passenger and freight traffic. To save coal, the present summer schedule of passenger-train services has been reduced by about 10 per cent. compared with 1946, and we understand that the winter train services are being planned on the basis of a somewhat similar reduction compared with the scheduled mileage which was being run at the commencement of last winter. The possibility of making any further cut in these proposed services without causing very serious inconvenience to the public appears, therefore, to be somewhat remote.

As to the movement of freight-train traffic, coal and iron and steel clearly require, and will be given, the first priority, but if increased coal becomes available, industrial production should rise generally, and it will be a matter of considerable difficulty to settle the order of priority for the acceptance of other traffics, as transport conditions may, and probably will, vary in different parts of the country. It is abundantly clear, therefore, that the supply of additional materials and labour to enable the railways to place additional wagons in service is of the highest importance.

* * * *

Increased Railway Charges

ALTHOUGH some unpleasant problems are occasionally solved by the effluxion of time, procrastination hardly can be acclaimed a virtue, and, in fact, frequently may be the opposite. This is certainly the case in regard to the recent, but very long overdue, Government announcement that railway charges are to be increased, for a more inopportune time for making such an increase could not have been chosen, having regard to the Prime Minister's announcement of the grave economic crisis which confronts the nation. Although railway costs rose materially during the war, railway charges had risen by the end of the war to only 16¾ per cent. above pre-war for freight traffic and passenger traffic, other than season-ticket rates and workmen's fares, which had been increased by only 10 per cent.

The charges were maintained at a level greatly below the general price level because of the heavy wartime traffic, and it was evident that, when the war ended, the decline in traffic would make it necessary for railway charges to be reviewed. Accordingly, on July 1, 1946, passenger fares and passenger-train rates were increased to 33¼ per cent. above pre-war, and season tickets and workmen's fares, and rates for freight train traffic generally, to 25 per cent. above pre-war. Since that date, however, costs have continued to rise and the volume of traffic to fall; consequently, the gap between receipts and expenditure has steadily widened. Therefore, on May 30, 1946, the Charges Consultative Committee was asked by the Minister to advise as to the best method of adjusting railway charges, so that in 1947 the aggregate net revenues of the four main-line companies would approximate to the aggregate of the fixed annual sums (£38,633,000) payable by the Government under the Railway Control Agreement.

After a lengthy public hearing the Committee recommended on November 15 that passenger fares and passenger-train rates should be increased to 35 per cent. above pre-war and freight train rates from 25 to 30 per cent. above pre-war. The Government, however, was unwilling to announce even such modest increases, with the result that the gap between receipts and expenditure continued to widen.

In November, the Charges Consultative Committee estimated that, unless the increases were imposed, the companies would earn £9 million less in 1947 than the fixed annual sums to which they were entitled. In February, 1947, the Minister said the Government proposed to review the matter at the end of March in the light of further experience, and in May he estimated that the severe weather and the fuel crisis would cause a deficiency in the 1947 net revenue of £32 millions. The Minister now estimates that the deficiency will approach £37 millions, without allowing for implementing the recommendations of the Court of Inquiry into railway wages and hours, and that, although the control agreement will be terminated at the end of the year consequent on the Transport Act, it is estimated that, on a similar basis, there will be a deficiency of about £28 millions in 1948. The cost of implementing the wage award from July 1, 1947, is estimated at £22 millions in 1947 and £37 millions in 1948, making a total deficiency in 1947 of £59 millions and in 1948 of £65 millions.

Partially to meet these huge expected deficits, the Minister of Transport has announced that all railway charges will be increased to 55 per cent. above pre-war as from October 1 next. This will represent an increase over the present charges of 16¼ per cent. in the case of ordinary passenger fares and rates for merchandise by passenger train, and of 24 per cent. in the case of other charges. It also ends the differentiation now made in favour of freight traffic, season tickets, and workmen's fares. At railway-owned docks the increase in charges on coastwise liners and their cargoes will be raised from 15 to 25 per cent., and this charge will apply to all coastwise vessels and their cargoes. All other dock charges will be increased from 40 to 75 per cent. above pre-war. These increases in total are estimated to yield £15½ million in 1947, which will still leave a deficiency of £43½ million to be met by the Exchequer, and to yield about £65 million in 1948.

The estimated weighted average percentage increase in all railway costs over pre-war is now 80 per cent., and on this basis the increase in railway charges clearly is justified. On the other hand, the increase is likely to have a serious adverse effect on the country's export trade at a most critical time, and it is unfortunate, to say the least, that a decision should have been postponed for such a long time as to necessitate such a heavy increase. The proposed increase will involve a rise of 1s. 9d. per ton in the average rate for the conveyance of coal, and, as several tons of coal are required in connection with the manufacture of one ton of steel, the effect on the price of steel readily can be appreciated. This additional burden coincides with the Government decision that the export trade of the country must be developed at all costs, and it cannot but have an adverse effect on our competitive position in overseas markets.

A further point is that it will cause an increase in the prices of coal, iron, and steel and many other commodities which are purchased in large quantities by the railways. This will further increase their present level of expenditure and lead, in turn, to a further increase in charges being justified, unless traffic revives to such an extent as to offset the increased costs. The Minister has stated that the question whether the relationship between the various types of charges should be varied will be one for the Transport Tribunal, which will settle the charges schemes of the British Transport Commission after hearing the views of the Commission and of bodies representative of all classes of users. As the Transport Act provides that charges schemes should be submitted to the Tribunal within two years after the passing of the Act, or such longer time as the Minister may allow, it is clear that no immediate relief can be anticipated by the basic industries in this respect.

In this connection, however, it is of interest to note that the Minister did not mention the substantial saving in interest charges which should be secured in 1948 by reason of the confiscation of such a large proportion of railway capital. There may be several reasons for his reticence on this point, one of which may be that he does not wish to circumscribe the British Transport Commission in providing for the redemption of railway capital or making proper allocations to a general reserve as directed in the Transport Act.

The Pullman Transfer Complete

A NEW chapter in American railway operation opened on June 30 with the payment, by a group of 57 railways, of a cheque for $40,202,482 to Pullman Inc., as the purchase price of the entire capital stock of the Pullman Company. Eighteen months previously, individual railways had bought for about $35,995,000 all the Pullman Company's parlour cars and some 600 lightweight sleeping cars. These were the final transactions in the seven years of litigation by which Pullman Inc. had been compelled, under the Sherman anti-trust law, to divest itself either of the manufacturing or operating side of its business. Having elected to retain its more profitable manufacturing activities, Pullman Inc. now intends to devote the $76,000,000 obtained from the sale of its cars and other operating assets, to expansion of its manufacturing facilities, acquisition of other related enterprises, or reduction of capital. Thus, after an honourable record extending over nearly eighty years, Pullman retires from its great sleeping-car business which has made its name a household word in travel.

The original Pullman Company was incorporated in 1867, after eight years of experimental running of luxury cars by its founder, George M. Pullman. By 1900, Pullman had absorbed various privately-owned competitors in the sleeping-car field, and in subsequent years took over also the majority of the sleeping-car services owned and operated by individual railways. Ultimately, the Pullman pool of sleeping and parlour cars totalled approximately 6,500, working on nearly 1,400 different services, and providing luxury travel all over the United States. At its extensive plant outside Chicago, the associated Pullman-Standard Car & Manufacturing Corporation built the whole of the cars required by the Pullman Company, and had developed many modern improvements in sleeping-car design, such as the single-room and "roomette" types of car in place of the old standard convertible cars of the "section" type.

It was because Pullman built all its own cars, and refused to use or service modern lightweight streamline sleeping cars built by competing firms, that the anti-trust suit was filed by the Department of Justice on July 12, 1940. This claimed that Pullman was forcing restrictive contracts on the railways, to the detriment of other car manufacturers. Although the evidence, in the main, did not support the contention that Pullman had been behindhand in car development, and no failure to give adequate service could be proved, it was not possible to rebut the charge of monopoly. On April 20, 1943, therefore, the Federal District Court at Philadelphia handed down a ruling that there had been a violation of the Sherman Act, and a year later, on May 8, 1944, Pullman Inc., which had been given the option of remaining either in the manufacturing or the operating business, but not in both, and had chosen the former, was directed to dispose of its affiliate, the Pullman Company.

A number of different financial interests endeavoured to purchase the Pullman operating assets, but after a series of court sessions Pullman elected to sell out to a consortium of the railways. Though disposal to the railways was opposed by the Department of Justice and other interested parties, in January, 1946, the Pullman plan was approved by the Federal Court, and all attempts at obstruction failed when the U.S. Supreme Court affirmed the sale in March, 1947. Two months later, the Interstate Commerce Commission approved the pooling plan by which the 57 railways concerned had agreed to divide up the purchase price, and it is this transaction which has been completed recently.

The new railway-owned company retains the old name of the Pullman Company, and also practically the whole of the 30,000 Pullman employees, excepting only those executives who hold positions also with Pullman Inc.; by order of the court, no directors or officers are permitted to hold office both in Pullman Inc. and in the new company. As certain railways have purchased the majority of the modern lightweight Pullman sleepers, and also have obtained new lightweight stock from Pullman-Standard, Budd, and other building companies, it remains to be seen whether they will adhere to their expressed intention of running their own internal sleeping-car services in future. One such railway, for example, is the Pennsylvania, whose sleeping-car services are on a very extensive scale.

But the indications are that the majority of the railway-owned cars will be leased to the new company, which will continue to operate both the individual railway and inter-railway sleeping-car services on much the same lines as before. According to the nature of the contract with the railway concerned, the new Pullman Company will service, or both provide and service, the sleeping cars, and keep them in good repair; also it will collect the supplements for Pullman seats or berths. The railways on their part will run the cars in their trains without charge, sell through their agents tickets for seats and berths, and turn the revenue so obtained over to the Pullman Company. From this, the latter will deduct its operating expenses, car rentals, and certain depreciation expenses. The balance will be divided equally between the railways and the company; if there is a deficit on any specific service, this will be paid over to the Pullman Company by the railway concerned.

It is of interest to recall that up to the transfer of assets in 1947, Pullman has had five presidents only. George M. Pullman himself held this office till his death in 1897; he was succeeded from 1897 to 1911 by Robert Todd Lincoln, son of U.S.A. President Abraham Lincoln; then came John S. Runnells, from 1911 to 1922; Edward F. Carry, from 1922 to 1929; and D. A. Crawford, from 1929 until the present year. The President of the new company is Mr. Carroll R. Harding, former Assistant to the President of the Southern Pacific, who has had a wide administrative experience.

* * * *

Locomotive Running-Shed Practice

WE noticed briefly in our June 6 issue a book by Mr. Harry Webster on "Locomotive Running-Shed Practice."* The subject matter is dealt with in alphabetical order, and this arrangement, although having its advantages, has a tendency to interfere with continuity from the point of view of a reader perusing the text consecutively. We consider, however, that Mr. Webster's book will form a very handy work of reference for those interested in locomotive running-shed work, and he has produced a comprehensive survey of the various activities which come under the day-to-day notice of district locomotive superintendents. The practices of the various main-line railways in this country are set out in a clear form and make interesting reading.

The author makes interesting references to the "X" scheme of examination and repair as practised on the L.M.S.R., and it is possible that there is some slight misunderstanding of this matter; it would, therefore, be useful to point out that from published accounts of the motive-power organisation on the L.M.S.R., it has been brought out that repairs reported by drivers between two "X" scheme periods receive the personal attention of the foreman fitter. These repairs are usually minor, and any repair which in the opinion of the foreman fitter should receive immediate attention is carried out. It is apparent from the information which has been published in regard to L.M.S.R. organisation that the underlying idea of the "X" scheme examination and repair is to anticipate repairs by carrying out examinations—and any repairs found necessary consequent on these examinations—at predetermined periods; and, therefore, the author's fear that minor repairs may, through lack of attention between "X" scheme examinations, develop to a major repair, can be set at rest.

It is very pleasing to see that the author calls attention to the necessity for good amenities, and this subject has not been raised too early, because there is little doubt that the question of good amenities at running sheds had been neglected for many years. Reference is made in various parts of the book to L.M.S.R. standard practices, and it is inevitable that some changes will have been made in the period between the author writing the book and its publication, so that there is always a likelihood, as in this instance, of it not being in strict conformity with existing practice.

The author is to be congratulated on producing a very interesting and informative book, which should prove most useful to all who are connected with the work of a motive-power department, and should be particularly useful to the younger men of the industry in placing at their disposal information which can be acquired otherwise only as a result of years of experience.

* "Locomotive Running-Shed Practice." By Harry Webster. Oxford University Press, Amen House, London, E.C.4. Price 18s.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Protection for Tube Tunnel Entrances

252, Tufnell Park Road,
Tufnell Park,
London, N.9. July 28

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In your issue of July 18, the article headed "Protection for Tube Tunnel Entrances" describes the system of train detection at East Finchley as being of the insulated current rail type. Actually, this type of detector was in operation only during the preliminary stages of the Northern Line extension from Archway to East Finchley in June, 1939. On alteration of the track layout at East Finchley, and the further extension to High Barnet in March, 1940, the mercury-tube type of detector was installed, and this is in operation today.

Yours faithfully,
ALEC GORTON

Power Reverse Gears

390, Wakefield Road,
Huddersfield. August 4

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The letter on this subject from Mr. Slee throws much interesting light on the practical aspect, which is what really matters. It still leaves it open to consider power reversing gears for shunting engines because:—

(*a*) The frequency of complete reversal is such that power assistance materially lightens the driver's work.

(*b*) Little harm is done if the mechanism does refuse to stay in anything but full gear.

(*c*) A quick-reversing gear could speed up shunting work.

To secure the last advantage, it might be necessary to use mechanism different from that already employed. Some existing power reverse gears are no quicker than screw reverse, and, while slow motion is necessary if attempts are to be made at fine adjustment, the same restriction does not apply in a shunting engine.

I would venture as an opinion that power reverse is unnecessary and undesirable in main-line engines, but can be useful in shunting engines. For small engines on pick-up freight work, lever reverse is probably the best compromise between convenience and complication, but whenever in doubt, fit screw reverse.

Yours faithfully,
W. A. TUPLIN

Underground Coach Design

The Brown House,
Meopham, Kent. July 28

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The new L.P.T.B. coach described in your issue of July 18 may be ideal for passenger comfort in the outer suburban area, but surely London Transport could spend its energies better by attacking the rush-hour congestion problem on the District line between Aldgate and South Kensington. Trains stand so long in stations that following trains pile up at the preceding signal sections, and inter-station journeys develop into a succession of checks and halts.

As long as passengers are expected to alight and board through the same three sets of doors, it is absurd to hope for any improvement in spite of the raucous blaring of loud-speakers. New rolling stock should be designed expressly to deal with the maximum traffic requirements of the rush hours, and I submit that coaches should have at least six double-doors per side. Doors then would be close enough to allow alternate doors to be reserved for alighting and boarding respectively. With clear indications, the public soon could be educated to use the correct doors, and would co-operate gladly when the increased efficiency obtained by so doing was realised.

Inevitably, the design would reduce the present number of seats, but this would be more than compensated by increased standing room. But it is better to face up to realities and admit that, with existing train lengths, the majority of passengers must stand, and it is not illogical to sacrifice a few more seats if decreased journey times can be attained thereby. London Transport could learn a lot by watching the smart station timings on the Southern Electric, where ten doors per coach allow passengers to pour out in a flood.

The ventilation of District Line stock is another matter which requires improvement, as five minutes' journey in the rush hours in summer is enough to leave the average passenger soaked in perspiration due to lack of air movement. This compares ill with some coaches on the Paris Metro, where there are vertical gaps some 6 in. high running the length of the car on both sides between the top and bottom portions of the clerestory roof. This allows vitiated air to flow freely out of the car, and gives enough air movement inside to evaporate moisture from the skin without distress.

Yours faithfully,
G. M. BARRETT

Change in Railway Control

Danes Mead, near Romsey,
Hants. August 8

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—What will be the reaction of the six hundred thousand odd men and women in the railway service when the lines are pulled up by the roots and transferred to the State? Their opinion has not been sought. They are to be bought and sold like so many pounds of tea. For over a hundred years the lines have been controlled by gentlemen. Will the staff have the same regard for mere politicians? Would they take kindly to the appointment, if the Minister should think fit, of his butler as stationmaster at Waterloo with frock coat, top hat and all? It is an interesting thought.

Yours faithfully,
SAM FAY

Alleged Railway Inefficiency and its Cure

London. August 6

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—"Statistician" in his letter of July 27, compares the total freight train-miles per train-hour in Great Britain in 1946, with 1938, and infers that in 1946 railway operators did not make a determined effort to achieve pre-war mobility. He makes passing reference to some engines being wheezy and to poor locomotive coal, but not to the fact that the ton-miles moved in 1946 were 4,400,000,000 more than in 1938, or even that 1946 ton-miles were 1,500,000,000 greater than those of the peak pre-war year, 1924.

Apart from this, the division of total miles by total train-hours for 36,800 miles of track in the two years compared, does not take into account the great changes in the flow and nature of the traffics, the difficulties of working in 1946 owing to shortages of permanent way materials, shortages of staff in some areas, and a general decline in the physical condition of line and rolling stock from the high standard of 1938. The arrears of maintenance of the four companies at the end of 1946 represented £152,000,000, and the expenditure of that sum or even an appreciable part of it to give a flying start in 1948 does not seem likely.

Yours faithfully,
CONTROLLER

Cheap Mid-Week Tickets

52, St. George's Square,
Westminster,
London, S.W.1. July 26

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Warminster in Wiltshire is on the Great Western Railway practically mid-way between Salisbury and Bath. There is also a service of motor buses running between these two cities. Presumably to compete with these buses, the railway issues cheap mid-week tickets to Salisbury, but there are no cheap tickets to Bath. It would appear that it is considered good business to try to fill empty seats in trains running to Salisbury, but not in the same trains when they are running in the opposite direction to Bath.

I suppose that there is some deep reason for this, if one only knew, but surely if the railways wish to encourage travelling in the middle of the week, they should issue cheap tickets to every station. It is this exasperating discrimination between one destination and another which shows how little, even today, the railways know about making their services attractive to the public.

Yours faithfully,
CLAUDE SISLEY

[Unfortunately, the shortage of passenger vehicles, which can be overcome only very slowly, prevents the railway companies from attempting to encourage or attract travel at present. In August last year the railways were authorised by the Minister to introduce cheap-day tickets from selected stations to populous centres within a radius of 20 miles, and the distance from Warminster to Bath is 23 miles. Since that date, the shortage of coal has made it necessary for train services to be reduced by 10 per cent., which makes any extension of cheap-fare facilities undesirable.—ED., *R.G.*]

The Scrap Heap

THE WAY TO GET ON OUR FEET AGAIN

What have we lost from our national character in these recent years? One of the most vital things in life—what the famous Samuel Smiles of Victorian days called "self-help."

Trevelyan in his "English Social History" explains the difference between the Nineteenth Century, when Britain rose to greatness, and the Twentieth Century, when signs of decay appeared in the fabric, thus:—

"*The real strength and felicity of the Victorian age lay . . . in the self-discipline and self-reliance of the individual Englishman.*

"*. . . In the Twentieth Century, on the other hand, self-discipline and self-reliance are somewhat less in evidence and a quasi-religious demand for social salvation through State action has taken the place of the older and more personal creeds.*"

The creed that the citizen should no longer rely upon himself but should in all circumstances be sustained, directed and pap-fed by the State has spread across the nation like a pestilence.

Until we stay that plague and restore health to our minds, there can be no real hope for us.—*Mr. John Gordon in "The Sunday Express."*

* * *

DANGEROUS TO LEAN OUT OF THE WINDOW

In Great Britain as elsewhere an increase in crime has been one of the consequences of the war. A recent incident was rather ridiculous, though no less unpleasant for the victim on that account. A man was stopped near his home, robbed of his clothes and shoes and left to complete his journey in his vest and pants. The outrage may have been thought worth the risk because of the general shortage of clothing, but pre-war police records tell of similar misdoings in this country. In some areas it was—and perhaps still is—a practice for villagers with ingeniously contrived bamboo poles to assemble on selected railway bridges under which trains normally travel slowly. As a train crawled past with the usual row of heads projected in curiosity out of the windows, down would go the poles in rapid succession and a rich harvest of *pagris* (turbans) would reward the villagers on the bridge. Losing a *pagri* is for a poor man almost as much of a misfortune as being stripped of his clothes is for a richer victim.—*From "The Statesman (India).*

* * *

THE PERFECT APPRENTICE

To foster high craftsmanship among youth a "perfect apprentice" competition has just been held by London Transport's Works & Building Department at Parsons Green. Boys working in the department were given up to 100 marks and had to show proof of: diligence, initiative, quickness, courtesy, cheerfulness, co-operation, adaptability, accuracy, time keeping, and general conduct.

Nineteen-year-old apprentice Albert H. Peacock, of 32, Cheyne Row, Billet Road, Walthamstow, secured 94½ marks as the winner and received a prize of seven building, carpentry, and joinery books.

* * *

100 YEARS AGO

From THE RAILWAY TIMES, *Aug.* 14, 1847

GREAT WESTERN RAILWAY.—NOTICE is hereby given, that the next HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held, pursuant to the Act of Parliament, in Bristol, at the Bristol Station, on THURSDAY, the 19th day of AUGUST next, at Twelve o'clock, for the general purposes of business. The Chair will be taken at One o'clock precisely.

C. RUSSELL, Chairman.
CHARLES A. SAUNDERS, Secretary.

London Terminus, Paddington, July 20, 1847.

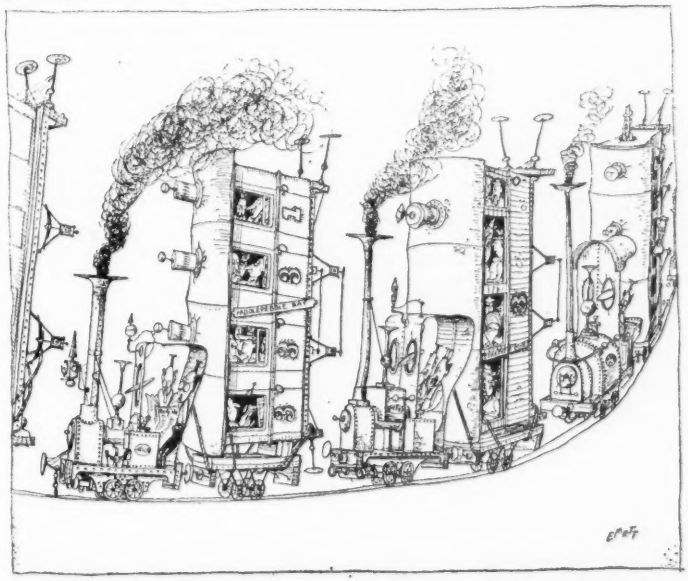
SOUTH WALES RAILWAY.—NOTICE is hereby given, that the next HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held, pursuant to the Act of Parliament, at the Paddington Station, London, on WEDNESDAY, the 25th day of AUGUST next, at eleven for twelve o'clock, for the general purposes of business. The chair will be taken at twelve o'clock precisely.

C. RUSSELL, Chairman.

The transfer books will be closed on the 11th of August, and will not be opened until after the said Half-yearly General Meeting on the 25th of August.

N. ARMSTRONG, Secretary.

South Wales Railway office, 449, West Strand, London, July 28, 1847.



"Just when we've found a way to crowd more 'oliday trains on the line—pfft! ten per cent. cut . . . .!"

[Reproduced by permission of the proprietors of "Punch"

SOME RAILWAY MEMOIRS—1

By Sir Sam Fay

On one occasion, when we had dinner at a pub in the High Street, Southampton, we marched from the station in single file, close together. Before long a crowd gathered, the police appeared and ordered us to disperse as we were causing a disturbance. We replied that we were only walking in an orderly way. The police waited for us after dinner, expecting we should then become boisterous, but they were disappointed: we dispersed one by one. . . .

The Midland applied to Parliament for the power to purchase the London, Tilbury and Southend Railway. This affected the interests of the Great Eastern. I gave evidence on their behalf. Talbot, K.C., in cross-examination, said to me, "You were one of the Committee appointed by Mr. Lloyd George to inquire into the position of railways. You wrote a memorandum advocating amalgamation of railways in general. How do you reconcile that with your evidence today?"

I replied that when I wrote the memoandum I did not think any Company, not even the Midland, would have the temerity to seize the north bank of the Thames and monopolise it. This rather staggered him. Agreements satisfying the Great Eastern were subsequently signed. . . .

The Superintendent of the Line, Mr. E. W. Verrinder, asked me to enter his office. A year later I became Chief Clerk. He was not an easy man to get on with. He had an idea that scowling at an employee was the best way of enforcing discipline.

He went round the office at Waterloo and straffed everyone for errors never committed. I remained with him for seven years. At the end of that time he appointed one of my subordinates as a District Superintendent. To this I offered objection on the ground that such a post should have been given to me. I appealed to the General Manager, who told Mr. Verrinder it was evident that I should not get on very well with him in future. I was then appointed Assistant Stores Superintendent at Nine Elms. There I remained eleven months.

Mr. Verrinder died in 1901. He was succeeded by Mr. George White, District Superintendent at Exeter. When the latter died I was asked to succeed him. . . .

In 1906, I toured the United States and Canada in company with other railway men, among them J. P. O'Donnell, a pioneer of automatic signalling. The Chairman of an American Company lent us his private car, complete with negro servant and food. We travelled from Montreal to Vancouver, crossed over to Vancouver Island, then to Seattle and on south to San Francisco. It was the year of the earthquake. Only one street was cleared. I lost, or had stolen, our railway passes back to New York. We were passed by telegraph messages from post to post. We spent some time in the glacier region, staying at the Old Faithful Inn.

In crossing the Great Divide we came to Medicine Hat, infested by rattlesnakes. Natural gas lighted the lamps in the town as well as the station signals.

At Salt Lake City we stopped awhile, listening to tales about Brigham Young and his wives; two of them were still living in the beehive.

I joined the New York Railway Club, of which I believe I am now the oldest member. . . .

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

INDIA

Mysore State Railway Improvements

The Mysore Government has accepted recommendations of the Railway Board to purchase 25 additional locomotives, 87 coaches, and 690 wagons. The electrification of the railway between Bangalore City and Mysore, including suburban area lines, at a cost of Rs. 4½ crores, is under investigation. Improvements to the Bangalore City Station, and certain other stations, such as Arsikere, Davangere, and Mandya; the introduction of traffic control by telephone; and the establishment of wireless communications are included also in the scheme.

Inter-Class Sleeping Cars

Hospital coaches, returned by the military authorities to the Railway Board, have been turned to good account by conversion into inter-class sleeping cars. First introduced on the Calcutta-Darjeeling section, the E.I.R. authorities put them on the Benares-Delhi line, and now have extended the service to Dehra Dun. The experiment has been successful. It will be at least a year before a specially-made inter-class sleeper is ready. This will be when the prototype "Silver Arrow" train, now on exhibition throughout India, has been approved finally, and similar stock is being manufactured in large numbers. The "Silver Arrow" was described briefly in *The Railway Gazette* of May 16.

BURMA

Train Service Improvements

There has been a reduction in the activities of dacoit bands, as a result of which night running had been suspended earlier in the year, as recorded in *The Railway Gazette* of May 23. In due course it was possible to restore first the goods and then the passenger services. On June 16 one up and one down service was accelerated to make the Rangoon-Mandalay journey in 22 hr. Another improvement in the timetable has been the extension of two Pegu-Martaban trains to start from, and terminate at, Rangoon instead of Pegu.

Developments in Signalling

The signal boxes at the north and south ends of Insein Station, on the Rangoon-Prome line, are being restored, and a new frame has been built in the engineering workshop for installation at Ywama, where the double-track section from Rangoon terminates. Signals at four stations south of Paleik, on the line from Mandalay to Rangoon, are having their posts strengthened in readiness for operation by electric motors.

SOUTH AFRICA

Rolling Stock Replacements

Steel shortages and lack of trained staff during the war seriously affected rolling stock replacement. Between 1940 and 1946, only 12,500 new goods wagons were put into service. After allowing for scrappings, the increase amounted to only 9,000 vehicles. Many of the new wagons now on order will be built in the Union, where the manufacture of railway wagons by private enterprise is well established. Production was started in 1945, and deliveries are being made at the rate of about 20 a week.

The rolling stock programme also provides for 1,500 new passenger coaches, and orders for several new and improved types have been placed. These will raise the number of standard-gauge passenger vehicles to nearly 6,000. The cost of new rolling stock has risen steadily in the past few years, and the price of wagons has doubled since before the war.

Railway Building Programme

The Railway Administration has replied to criticism of its policy of building tunnels and "palatial stations" while materials are scarce. It is pointed out that no new stations are being built at the moment, and that the railway reconstruction programme, which includes the straightening out and regrading of main lines and the laying out of adequate marshalling and goods yards, has for its principal object the improvement of train services.

For years the railways have been urged to buy new rolling stock to improve these services, and to provide greater travel comfort. The wagons have been ordered —a five-year plan aims at adding 32,000 of them—but if plans to provide the necessary marshalling and goods yards are not put in hand now, this great increase of rolling stock could not be handled; and the improvement of the main lines is a necessary preliminary to better services.

Enterprises such as railway hotels and new stations will have to wait, but there are important projects which cannot be delayed. The addition of new platforms to Johannesburg Station, for example, has for its object the greater travel comfort of more than 100,000,000 passengers a year, and it is essential to get this work done as quickly as possible. The regrading and straightening of main lines between Johannesburg and Cape Town, and between Johannesburg and East London, call for no building materials. These are all improvements which railway users have been demanding for many years, and it is necessary to push on with the work, as it means a greater safety margin, better operating conditions, and faster trains.

CANADA

New Method of Refrigeration

On June 23, 30 tons of frozen British Columbia halibut left Vancouver for Toronto and Montreal on board the C.P.R. "Seaboard" express goods train, as part of an experiment that may revolutionise present-day methods of wagon refrigeration. The consignment left Vancouver in two overhead-bunker refrigerator vans.

One van was serviced before departure and *en route* with the ice and salt mixture regularly employed in overhead bunkers. To the bunkers of the other van, however, ammonium nitrate had been added in an effort to depress temperatures to a new and constant low level. Whereas a temperature of +10° to 20° F. can be maintained with present overhead icing methods, a temperature of zero or lower is being sought for the further protection of frozen-food shipments.

The research experts believed ammonium nitrate may hold the solution to their problem. A total of 44 electrical thermometers, housed in the special sleeping-observation car headquarters of the scientists and transportation men, will automatically record comparative temperatures in both vans.

Among those accompanying the train in its experimental run across the Dominion are J. M. R. Harrison and David Taylor, of the Pacific Fisheries Experimental Station, Vancouver; J. L. Townshend, general supervisor of perishable traffic, C.N.R., Montreal; J. Carbert, refrigerator engineer, National Research Council, Ottawa; and Percy E. Brougham, supervisor of perishable traffic and weighing, C.P.R., Montreal.

UNITED STATES

Increase in Level-Crossing Accidents

Fatalities resulting from accidents at level crossings in the first four months of 1947 totalled 707, an increase of 31 compared with the corresponding period in 1946. In the first four months of this year, 1,593 persons were injured, as contrasted with 1,633 in the same period last year.

There were 124 fatalities resulting from level-crossing accidents in the month of April alone, an increase of two compared with the corresponding month in 1946. Persons injured in such accidents totalled 263 in April, 1947, as compared with 312.

EIRE

Holiday Luggage Facility

To help holiday-makers, especially those with families, C.I.E. introduced a new holiday luggage transport scheme on July 1. This serves travellers going to the South Coast resorts—Dun Laoghaire, Killiney, Bray, Greystones, and intermediate points. Collection and delivery of luggage is made on the same day, and instead of being charged on weight as usual, the luggage is charged per item on a simple scale, with a fixed payment for the trunk, the pram, the bundle of blankets, and so on.

Lorries Replace Rail Services

A number of minor stations on the midland, southern, and south-eastern main lines in the vicinity of Dublin has been closed to goods traffic. Lorry services have been provided in substitution of the goods trains. Passenger trains which were scheduled to halt at these stations continue to do so, but there are bus services in all the districts named. It has been found that goods can be carried to and from all these districts by lorries based on Dublin more efficiently.

HOLLAND

Electric Services

Every effort has been made to restore electric services, but shortage of rolling stock has necessitated mixed steam and electric working on certain sections, and diesel trains on others. Between Utrecht, Geldermalsen, and Eindhoven, for instance, passengers change trains at Geldermalsen.

In the mixed services the electric trains make more stops than the steam ones, and the regular overall timings thus are retained. In some cases, to use all classes of train and stock to best advantage, a through journey can be made in one direction, such as Amsterdam to South Limburg, but not in the other.

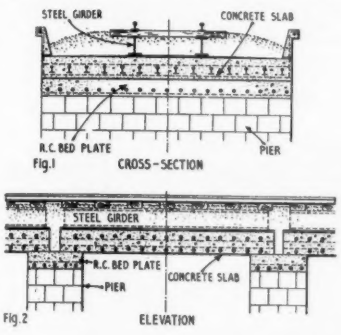
Improvements in the signalling and point equipment have enabled better connections to be given at certain junction stations, but the existence of single-line working on some routes, such as Amsterdam-Breukelen - Utrecht - Arnhem-Meppel-Leeuwarden, and Rotterdam-Roosendaal, is still a great hindrance to speedy and punctual operation.

Strengthening of Railway Bridges in Palestine

Measures taken to cope with modern loads and combat sabotage by providing R.C. slab spans and revetments for abutments and wings

THE majority of bridge spans in Palestine are small, few exceeding 60 ft., and most bridges consist of multiple small spans. They are required to carry the railway over wadis, which are usually dry from March to October. From November to February, sudden spates may be expected, but the long dry period enables falsework to be erected in safety on the wadi beds; there are no navigable channels to forbid this practice.

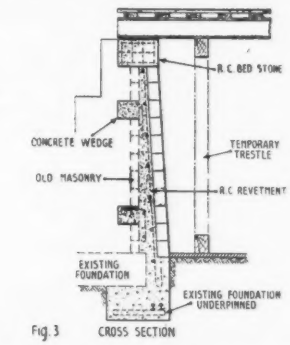
Increase in engine axle-loads from 17 to 20 tons and heavier traffic have combined to cause undue deflection and vibration in the many small girder spans. They also have tended to shatter the piers and abutments and cause wing walls and abutments to part company, a process assisted by vibration in the girders. Foundations also are in many instances too shallow and generally inadequate to meet these new conditions of traffic.



Concrete slab span reinforced with rails and rodding and R.C. bed plates replacing girder span, shown as still in place but subsequently removed

Consequently, here as elsewhere, various strengthening methods have been adopted, such as the provision of cover-plates to steel-joists spans, and of additional cover plates to weak plate-girders. Duplication of girders also has been carried out, and, when bedstones and/or abutments have to be rebuilt, deeper girders have been used to replace weak girders. All these methods have the advantage that the steelwork can be prepared in workshops under close supervision, and little line occupation is required. Also, compared with concrete work they are cheaper initially, and require no timber, which has to be imported and is expensive in Palestine.

On the other hand, replacement of steel by concrete slab spans is considered to make demolition by saboteurs more difficult, and ensures cheaper maintenance of both the bridges and the track over them. Concrete work in piers, abutments, and wings is usually stone-faced, as there is plenty of suitable stone available.



Abutment strengthened with R.C. revetment, keyed into it, and supported by under-pinning

Reinforced Concrete Strengthening

Recently, therefore, two kinds of strengthening in reinforced concrete have been adopted: (*a*) in the replacement of steel girders by slab spans; (*b*) in the strengthening of abutments and wings. Figs. 1 and 2 shown in the first column illustrate method (*a*).

The rails used to reinforce the slab are of 75-lb. section and are mostly spaced 1 ft. 4 in. apart. The depth of the slab is 1 ft. 6 in., and it is supported by R.C. bedplates 1 ft. 2 in. high. The reinforcement rodding is generally ½ in. To ensure ballast drainage a thin capping layer of quick-setting cement is added *in situ* with a transverse slope from the centre outwards in cross-section.

Strengthening of an abutment or wing wall or of both by method (*b*) forms the subject of Figs. 3 and 4. First, the girder span—in this case consisting of duplicated girders—is supported temporarily near the abutment to be strengthened by a single-bent timber trestle, thus relieving the abutment of all loading. As shown, a reinforced concrete revetment is then added, with a stone face, adequate batter, and staggered keying into the abutment and wing wall face. Here, again, the grillage is of vertical and horizontal rods of ½-in. dia.

The keying wedges, measuring 2 ft. × 1 ft. 6 in., are reinforced, too, by vertical and horizontal rods of ½-in. dia. Frequently, also, existing foundations have to be under-pinned with concrete walls reinforced by rails or rods, as seen in the sectional elevation. The work has to be carried out in sections by skilled labour under qualified supervision. The main disadvantage of (*a*) and (*b*) is that both lessen the waterway available in high flood.

Metal Spraying on Metal

A new method of preparing metal for painting

IT is well known that metals should be cleaned thoroughly before painting. What is not so generally known, however, is that the rule applies every time the metal is painted, not only on the first occasion.

Even on the first occasion, it is unusual for the surface to be properly prepared, for the reason that nothing short of shot-blasting or chemical treatment adequately can clean such surfaces, and neither the one nor the other can be applied simply.

Painting should be carried out as soon as possible after the metal has been prepared. This is not easy if some form of chemical treatment has been resorted to, for the chemicals used have to be removed completely, which involves a treatment in itself with a possibility of undoing in part what the chemical treatment accomplished.

There is also the point that simple chemical treatments are not protective of themselves to an adequate extent, although they may prove of value if used as a part of a definite protective programme. If such a chemical coating is used, it is essential that it be insoluble in paint or any paint vehicle, that its adhesion to the metal be perfect, and that it provides a complete buffer to any action between metal and paint. These conditions are difficult to fulfil in their entirety.

An alternative is to prepare the metal for the reception of a metal-sprayed confine by shot-blasting, and then to give a protective coat of metallic zinc. By doing so, one can provide complete protection for the metal, and provide, also, a perfect anchor for the paint, ensuring that the life of both paint and metal will be prolonged beyond the term usually provided by ordinary preparation and painting. This can be done with the Schori metal-powder pistol supplied by Schori Metallising Process Limited. This system, which is comparatively new, enables metal powder to be sprayed through the flame of the pistol to give decorative or anti-corrosive coverings to any metal surface.

It is claimed that the spraying of metallic zinc by the Schori method fulfils all the requirements for preparation and undercoat outlined previously. The preparation of the surface by shot-blasting ensures that every square millimetre of the surface is adequately cleaned and bright fresh metal exposed. The application of the metal spray follows the shot blasting almost immediately, and so no time is allowed for any new attack on the cleaned metal surface. The roughing of the surface by the shot-blasting provides an admirable key for holding the zinc protective coat to the metal, and the physical character of the zinc surface equally provides a perfect key for the subsequent coat of paint.

Although for many purposes the coating of metallic zinc alone can provide adequate protection, there are, however, many instances where painting is preferable to the metallic zinc surfaces, especially in marine practice, and the same applies to plant used in industry, particularly in the heavy industries.

Battery Locomotives of London Transport

Battery supply is used when power is off for maintenance purposes, but current can be taken from conductor rails both for traction and charging

FOR special duties in connection with the relaying of permanent way and other constructional work, the London Passenger Transport Board uses battery locomotives which have several features of great interest, in particular the control systems used. Nine of these locomotives are in service, of which three, bearing the numbers L 41 to L 43, are provided with the Metadyne d.c. control system developed by the Metropolitan-Vickers Electrical Co. Ltd.; while the other six, numbered L 35 to L 40, have the G.E.C. control system.

The general dimensions of both classes are identical. They are double-bogie machines, each bogie being mounted on four 3-ft. dia. wheels, with the axles spaced at 7-ft. centres. The centres of the bogies are 31 ft. apart. The overall length over the coupler faces is 54 ft. 4¼ in., and the height from the rail to the top of centre roof-sheets (9 ft. $5\frac{5}{16}$ in.) comes within $\frac{1}{8}$ in. of the loading gauge. The maximum width is 8 ft. 8½ in.

A cab is provided at each end for the driver, side and end doors, and an excellent lookout, with safety glass, being notable features. The cab floor is at a lower level than the solebars or centre longitudinals, and a tip-up seat is fitted for the driver. A cab heater and a fire extinguisher are included in the equipment. A centre gangway or corridor connects the two cabs. Sand gear is fitted to each bogie, one sandpipe being taken to each wheel at the outer end.

The total weight of the locomotives with the Metadyne equipment is 56 tons 8 cwt., while those having the G.E.C. equipment weigh 53 tons 17 cwt.

On either side of the centre gangway, the main battery groups are located. There are 160 cells in all, arranged in cases of four cells each, and two cases to each section. In assembly, the cases are lowered through the roof and wedged in position. Twenty-four hinged roof-panels are provided to give access to the batteries, and along the sides of the body are twenty-four detachable louvre panels. The four-cell battery cases are supported on porcelain insulators 2 in. diameter by 1 in. thick laid on beams 2 ft. 3½ in. long and 3 in. thick. Ebonite troughs are arranged to protect the framing members from spilled acid.

The electrical equipment is so designed that the locomotives can operate either from the battery or from the conductor rails. When using the conductor rails, the battery receives charging current; alternatively, an external source of supply can be used; for example, in sheds where no live rails are fitted.

The locomotive is designed to operate on a line voltage of 600; the total capacity of the battery is 768 amps at the 5-hour rate. The power equipment consists of four motors of approximately 138 h.p. hourly rating at 600 volts.

Four positive and two negative collector shoes are provided. These are of standard type, but the design allows for easy alteration to current collection from a centre positive and earth return. There are two shed plugs (for battery charging from an external source), one on each side of the locomotive. No shoe fuses are provided, all positive feeds being connected to a busbar and led to a positive equipment fuse. All negative feeds are treated similarly. A main isolator is included also. Control is carried out by electro-pneumatic switchgear. The auxiliaries (lights, compressor for air brakes, and control) are fed direct from the battery in all cases.

L.P.T.B. battery locomotive No. L 41 with Metadyne control system

G.E.C. Control Equipment

An important item in the G.E.C. equipment is the battery to track changeover switch, which works similarly to an electro-pneumatic reverser and comes into use in multiple working; that is, when one locomotive is at the front of the train and the other at the rear. It enables one locomotive to run on the batteries and the other to pick up from the conductor rails. The master switch is of the key type, since control must take place only at one point. The main isolator has the following positions: (1) motors in: charge battery; (2) motors out: charge battery; (3) motors out: gas battery; (4) all power circuits isolated. Normally, changes from one position to another must be made by the reverser key operating in a special lock which (until unlocked) prevents the isolator from being moved; moreover, until the key is moved to the "locked" position, the key cannot be removed.

Battery charging is carried out at three rates; one, associated with an over-current relay, is used when the battery is abnormally discharged; the other two are used, normally, in succession, the higher of the two changing to the lower as soon as the voltage has built up to a given value.

The traction motor circuits have a large number of steps to suit the type of service required (varying speeds, varying loads, and two voltage ranges). There are three combinations: series, series-parallel, and parallel. The direction of motion is controlled by the usual type of reverser.

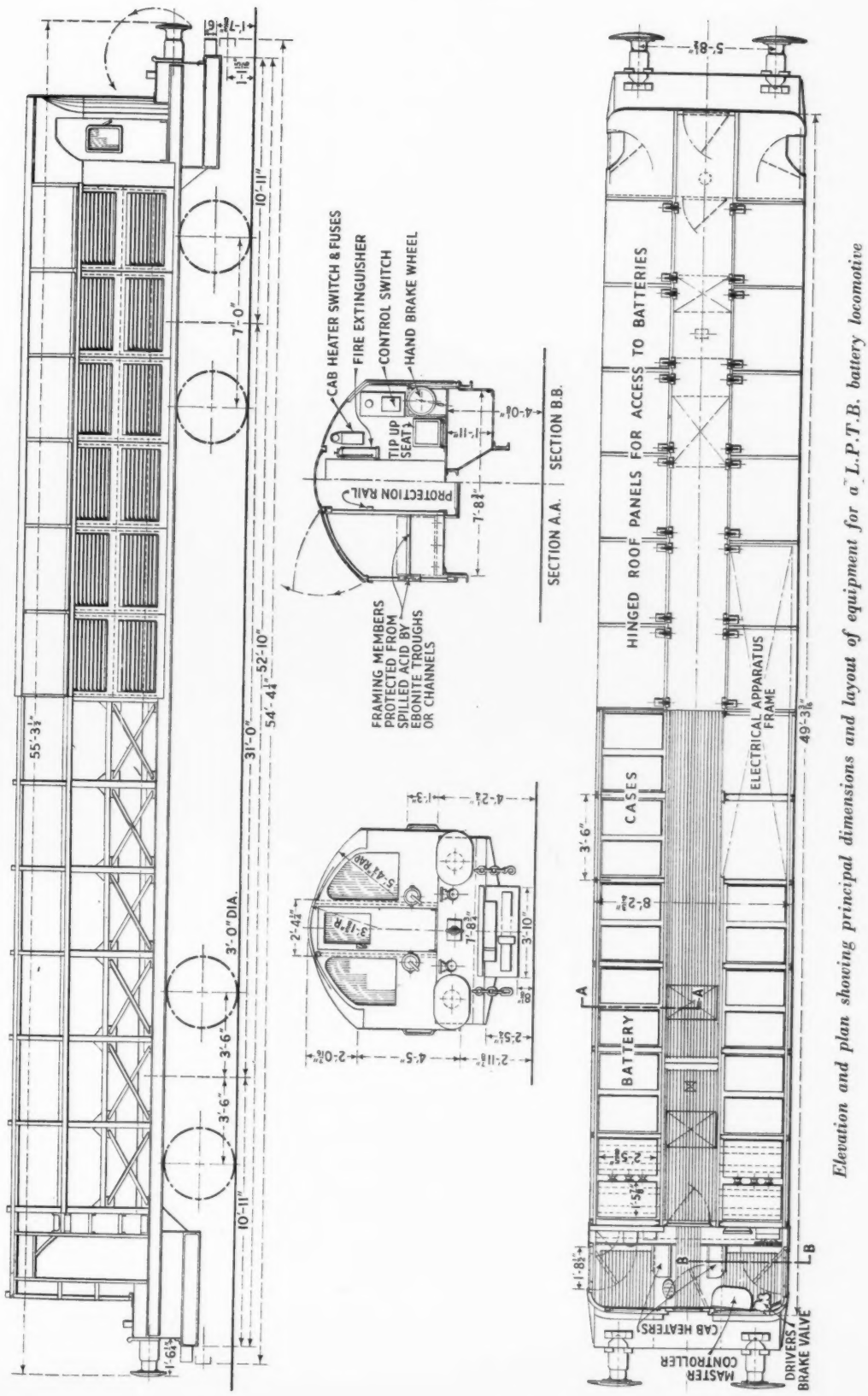
The master controller is arranged for 28 steps. At the Board's request, all three combinations are obtained on the one handle, and no separate combination handle is provided. The usual "dead man's" drum and mechanism, and reverser drum, with the normal interlocks, are embodied in the controller. Twenty train-line couplers carry the control lines from locomotive to locomotive. No bifurcation is arranged, as the locomotives and stock never can become turned.

The motor cut-out is arranged on the "half-locomotive" principle; when motors 2 and 4 are cut out, the associated "leg" of resistance also is cut out. The same applies to motors 1 and 3, which are cut out with their associated leg of resistance. This method, though giving somewhat rougher notching under cut-out conditions, has the advantage that the locomotive can be handled under its own power in many more cases of failure than the usual motor cut-out system, which covers motor failures only.

The Metadyne Equipment

The Metadyne is a d.c. device marketed by the Metropolitan-Vickers Electrical Co. Ltd., and may be likened to the auto-transformer used in a.c. work; its aim is to give an approximation to a constant-current traction machine with notchless control, giving improved locomotive performance during acceleration, and avoiding the electrical and mechanical losses which are inherent where series resistances are used. A "variator" is incorporated to relate the current from the tractive effort required

Battery Locomotives of London Transport



Elevation and plan showing principal dimensions and layout of equipment for a L.P.T.B. battery locomotive

from the motors after the acceleration period is passed. A further refinement is the additional field-winding known as the "regulator," which maintains equality between the input and output powers.

The complete Metadyne set comprises three commutator-type machines mounted on a common shaft:—

(1) The regulator, which starts the set and keeps it running at a fixed speed;

(2) The Metadyne proper, which feeds the armatures of the traction motors;

(3) The exciter, which provides excitation for the variator winding and the fields of the traction motors.

In the London Transport battery locomotives, the Metadyne equipment is used for operation either from the battery or from the line, and also for charging the battery from the line. As with the G.E.C. equipment, the switchgear is electro-pneumatic. The regulator circuits in these locomotives, instead of being fed from the line, are always fed from the battery; this simplifies the switchgear layout. In order to produce the correct supply-voltage across the primary brushes of the metadyne before the main switches connecting to the supply are closed, the variator winding is excited, not from the line, as is usual, but from the exciter.

Direct-acting overload relays are provided in the main-line, battery, and regulator circuits. A thermal overload relay is connected in the regulator circuit. The operation of any of these will switch the Metadyne off the line. A no-volt relay, connected across the line, will operate on gaps or if power fails when the Metadyne is operating from the line; it is ineffective in battery operation. The motor relay has two coils, one connected across each set of motor fields. If an out-of-balance current occurs in either motor loop due to any fault, this relay will switch the Metadyne off the line. During charge, if the line fails, the battery will discharge into the Metadyne. A reverse-current relay will switch the Metadyne off the line and open the battery circuits if this should happen.

In operating the locomotive, the control supply is taken from the battery, which is divided into two sections, one being used for control supply during motoring and the other during charging.

The master controller has three handles: (*a*) the supply handle; (*b*) the reverse key; and (*c*) the main handle. In operation, the driver moves the supply handle to whichever of its five notches he requires—charge, line fast, line slow, battery fast, or battery slow.

He should then press the Metadyne start button. After waiting about 30 sec. for the Metadyne to get up speed, the reverse key can be operated and the locomotive started by moving the main handle. The latter is interlocked with the reverse key and has five positions, all running notches.

For charging, the driver must move the supply handle to the charge position, and, if necessary, start the Metadyne. He then moves the reverse key to forward and the main handle to the charge position. He can then return the reverse key to the "off" and withdraw it. In this way he can leave the controller locked, with the Metadyne charging the battery. If the Metadyne shuts down at any time, the driver should return the main handle to the "off" position and press the re-set button. If this fails, he should try resetting the overspeed trip.

Electrification Plans in Italy

Scheme includes first standard-gauge conversions in Sicily

AN ambitious plan for extensive further electrification of the Italian State Railways has been evolved, the whole to be completed by the end of 1950. Various main lines are included, such as the Rome-Caserta line, and, in Northern Italy, the Turin-Milan-Venice and Venice-Udine lines.

A beginning will be made with electrification in Sicily, where there are no electric standard-gauge railways yet; and on the Adriatic coast the whole line from Ancona down to Brindisi is to be converted to electric traction. Below is a list of the lines to be electrified under the scheme:—

	Miles
Turin—Milan[1]	95
Milan—Vicenza—Mestre—Venice[1]	165·9
Vicenza—Treviso[1]	37·3
Mestre—Treviso[1]	13
Treviso—Udine[2]	65·9
Rome—Caserta[3]	134·1
Ancona—Pescara—Bari[4]	276·9
Pescara—Sulmona...	42·2
Bari—Brindisi	69
Brindisi—Taranto	43·5
Total, mainland	942·8
Messina—Palermo	144·7
Messina—Siracusa	114·3
Total, Sicily	259·0

[1] Double-track throughout
[2] Double-track throughout, connecting at Udine with the electrified line to Tarvisio, 68·4 miles
[3] Double-track throughout, connecting at Caserta with the electrified section to Naples, 20½ miles (33 km.)
[4] Double-track between Bari and San Severo, 94·4 miles

Regarding the restoration of former electric services, the rebuilding of the overhead and feeder system on the Mediterranean coast-line between Rome and Genoa has been taken in hand already, and is completed between Genoa and Sestri Levante, a distance of 28 miles. Electric traction has been resumed for through trains on that section.

In the south, the electric system has been restored again between Rome and Ponte Galeria, a distance of 14·3 miles, but electric traction is not yet in use for the Pisa-line trains. It is confined for the time being to local trains between Rome and Fiumicino *via* Ponte Galeria, the 7-mile branch from Ponte Galeria to Fiumicino having been electrified also. Trains on the Rome-Pisa-Sestri Levante line are hauled at present by heavy American steam locomotives.

Nord-Milano Electrification Schemes

THE Nord-Milano Railways (Ferrovie Nord-Milano), owning and working the second largest privately-owned system in Italy, have evolved a scheme for the electrification of certain lines. The whole system, totalling 133¼ route-miles, extends from the Nord station in Milan through the industrial region as far north as the Swiss frontier, and as far west as Novara (on the direct Milan-Turin main line of the State Railways). Certain lines, totalling 33½ route-miles, have been electrified for some years.

The following lines are to be electrified under the new scheme:—

	Route-miles
Saronno-Malnate Olona-Varese Nord-Laveno	31·6
Malnate Olona-Grandate Breccia*	14·9
Saronno-Seregno†	9·3
Saronno-Busto Arsizio-Novara	25·5
	81·3

* Connects at Grande Breccia with the company's steam-worked Saronno-Como (Lago) line
† Connects at Seregno with the Milan-Como-Chiasso main line of the State Railways

Lines electrified already have a route-mileage of 30·3.

The electrification is to be spread over five years, and the expenditure is estimated at 1,500 million lire (about £650,000 at the present rate of exchange). The company intends to finance the conversion through the issue of debenture loans. In addition, it is hoped that the company will be authorised to increase fares and rates in order to adjust working receipts to expanding expenditure.

One of the most important bridges of the company, that carrying the Novara-Saronno line over the Ticino River, near Turbigo, some nine miles north east of Novara, was destroyed during the war. It has been replaced by a temporary structure, for which a permanent bridge is to be substituted. The cost of the reconstruction is to be borne partly by the company, and partly by the administrations of the provinces of Novara and Milan.

BELGIAN ELECTRIFICATION.—The first stage of the extensive electrification of the Belgian National Railways, outlined in *The Railway Gazette* of March 7, is reported to be making good progress. Much work has been done on the connecting link between the two main stations in Brussels (Nord and Midi), and on the 34·8-mile Brussels Midi-Charleroi line, where the conversion is expected to be complete early in 1948. For service on these two lines, 26 locomotives have been ordered from Belgian firms, but part of the equipment is to be supplied by Swiss industry. Altogether, orders for materials having a total value of fr. 850,000,000 (about £4,829,500) have been placed so far in connection with the electrification now in hand. Of this total, fr. 30,000,000 (£170,450) is accounted for by the electric locomotives to be supplied by Switzerland.

ROME-OSTIA RAILWAY.—The standard-gauge electric Rome-Ostia Railway, 15½ miles long, connecting the capital with the sea to the south of the mouth of the Tiber (the "Lido" of Rome), is at present being extended to Castel Fusano, some 2½ miles from its present (temporary) Lido do Ostia terminus. The extension, like the rest of the system, is double-track, and the track is being laid already. It is expected that the extension will be opened to traffic in a few weeks. The old terminus of the railway, with its once handsome building situated near to the centre of Ostia, has been wrecked utterly by the Germans. In order to build the extension, the line was diverted towards the south a few hundred yards before the old terminus, and a new station was built close to the southern end of Ostia. The four platforms of the new station are permanent structures, although the track layout is temporary.

L.M.S.R. Permanent Way Developments—3

Large-scale use of welding to expedite track repairs

TO meet the effects of continuous traffic during the war years, coupled with heavy track wear resulting from reduced maintenance, the L.M.S.R. is making increased use of welding in the construction and repair of its tracks. The welding staff, which was approximately doubled during the war and today numbers over 100, is now being augmented by a further 20 welders chosen from the platelaying staff. The use of welding is also being extended to the repair and construction of electric conductor rails and track components, in addition to ordinary running track. The men selected as welders are being trained in the latest technique of oxy-acetylene track-welding at the L.M.S.R. Welding School at the Northampton Permanent Way Depot, where, under the supervision of L.M.S.R. engineers, they are given practical instruction in the repair and reconditioning of worn switches and crossings. Platelayers have been found ideal trainees for track-welding work because their comprehensive knowledge of railway rules and regulations, and their natural confidence in working on a busy line, results in a reduction of repair time.

The L.M.S.R. is at present making use of welding for four main categories of trackwork, namely, re-conditioning worn and damaged switches and crossings; welding of rails into longer lengths; welding electric track components; and welding other track components, such as buffer stops, damaged rails, and wheel stops. The work is carried out mainly on the spot with the worn and damaged rails in position on the track, but an exception is provided by the welding of rails in long lengths, which is done by the electric flash-butt process. For repairs *in situ* portable oxy-acetylene equipment is used, and the welders usually work in pairs so that a lookout man protects both welders. The operators work facing approaching traffic, and assist one another in handling the gas cylinders and equipment.

The worn surfaces are built up by depositing metal from a filler rod, using the oxy-acetylene flame to bring the parent rail and filler rod to the fusing temperature. After a section has been deposited, it is heated by blow-lamp to a red heat and forged with a hammer, and subsequently dressed up with a flatter and a heavy hammer.

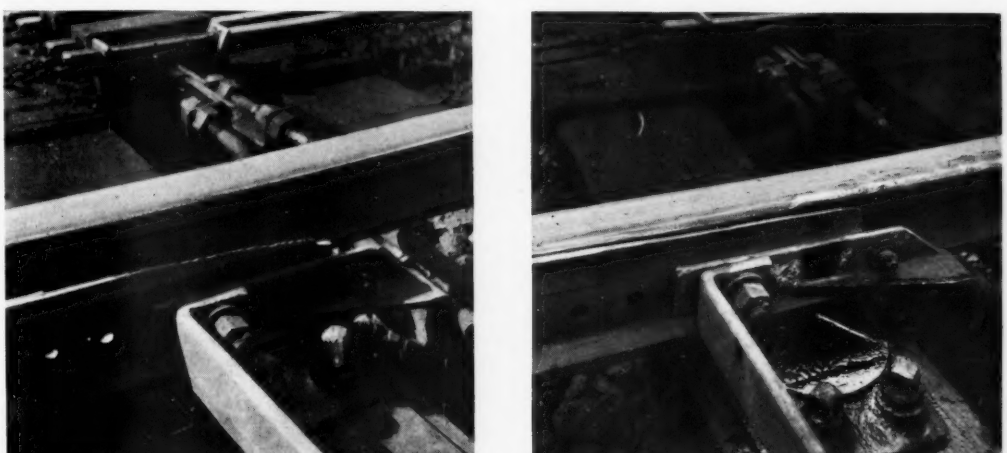
The repair of track components while they are in position is of particular advantage today when traffic diversions and interruptions must be kept to the minimum. This method has the additional advantage that the rail or track unit under repair can be built up to the height and form best suited to adjoining components which have become bedded down in use.

WORN SWITCH AS RECEIVED AT DEPOT
RECONDITIONED SWITCH AFTER WELDING
WORN VEE AS RECEIVED AT DEPOT
RECONDITIONED VEE AFTER WELDING

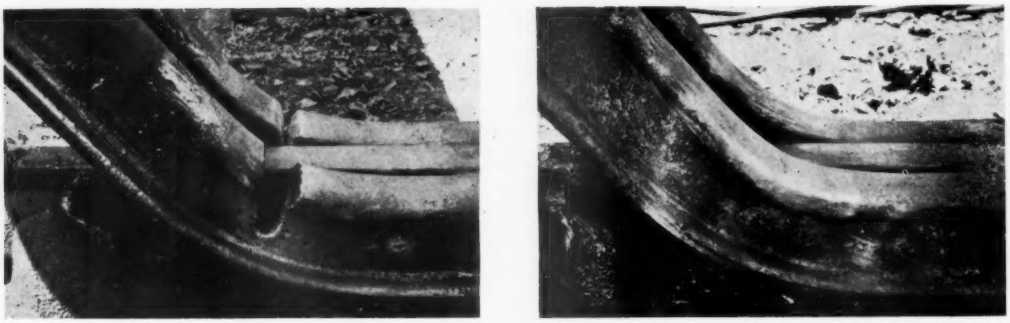
Redundant assets reclamation of scrap at Northampton permanent way depot. Worn switches and vees reconditioned by welding

Re-Surfacing Junction Components

The repair in position of switch-and-crossing units has been successful in reducing the replacement costs normally resultant from the comparatively short life of these units at a busy junction. The severe hammering such components



Badly worn point rail (left) which has resulted also in side cutting to running rail. The right-hand view shows the repair effected after building up both rails by welding



Damage to raker rail of buffer stop cut away in preparation for welding, and (right) filled and welded

receive from the wheels of high-speed passing traffic involved frequent replacement of the switches and crossings before the advent of welding, with consequent traffic interruptions during renewal. Today, some switches and crossings are re-surfaced many times during their life in a junction. Parity of life of switch and crossing units with adjoining components can be secured by more frequent welding of worn parts, so that a complete renewal of a junction can be undertaken, instead of piecemeal replacements.

Welded Running Rails and Conductor Rails

The L.M.S.R. has many miles of rails welded into lengths of up to 180 ft. Most of these long rails are flash-butt welded, but several have gas-fused welds, done with an oxy-acetylene blowpipe and filler rods. The introduction of faster and heavier trains imposes far greater loads on the track, particularly at the joints, and as a large proportion of the platelayers' time is spent in maintaining the track round the joints, it is a distinct advantage to reduce the number of joints. The advent of flat-bottom track should give a further impetus to the adoption of the welded rail.

The elimination of joints on bridges, and through level crossings, has become an established practice, which has given every satisfaction. The ends of the rails are cut with a blowpipe to form a vertical "V" on each side of the rail when joined together, with a containing angle of about 80 deg., and gas welding is used for making the joints.

The welding of electrical track components has been adopted to the greatest practicable extent, with the closest co-operation of the Electrical Department in respect of design to suit welding. Conductor rails have been welded into lengths of more than 600 ft., ramped down at each end, and connected by expansion bonds.

The smooth continuity of these long rail surfaces ensures freedom from shoe jumping, and the consequent arcing and burning of the conductor rails. Welding has also resulted in a considerable saving in materials for bonding the running and conductor rails. The weight of the welded running rail bonds is only 9 oz., whereas the old type weighed 6½ lb. The weights of the old and new types of bond for conductor rails are 10 lb. and 3 lb., respectively. Moreover, the terminals of the old types of bond frequently worked loose, and the length of the bonds on the running rails was such that they interfered seriously with the proper maintenance of the joints, joint chairs, and fastenings.

The welding of water troughs into long lengths has also proved satisfactory. Most of the troughs are pressed into shape from 10-ft. lengths of steel plate, which, in the past, were bolted together. The normal movement of the track under traffic made it almost impossible to maintain water-tight joints, and the loss of water was considerable, and added to the difficulties of the maintenance gangs. During the past 18 months, several trough renewals have been dealt with by welding from four to six sections together. The combined length of trough is either laid in by means of a crane, or skidded into position from alongside the track. The sections of trough are sent out from the works "veed" on the outer face, for filling in by electric arc welding, and a small sealing run is made on the inside face. A rotating jig has been developed to facilitate the welding.

Effect of Welding Water Troughs

Quite apart from the saving in labour in attempting to maintain water-tight bolted joints, which cannot be efficient under the normal strains imposed on the track, and the difficulties arising from continually saturated ballast, the welding of water troughs is advantageous from the point of view of the Motive-Power Department. The cost of treating hard water is considerable, and if waste from the troughs can be reduced to a minimum, the resulting economies will find a welcome reflection in reduced operating costs.

Weld between two sections of pressed-steel water trough, showing also (in the right-hand view) the method of rotating the troughs by jigs to facilitate welding

Railway Assistance for Hydro-Electric Scheme

Works on the L.N.E.R. West Highland line for conveyance of materials and construction of pipeline

Construction of bridge at Inveruglas to accommodate pipeline from Loch Sloy to the power station

WHEN the West Highland line of the L.N.E.R. was constructed in 1894, there was no prospect of a heavy goods traffic, and with the exception of passing places at most of the stations on the route, only a single track was built. A new situation has been created, however, in connection with the Loch Sloy electric-power scheme of the North of Scotland Hydro-Electric Board.

Difficulties arose in the transport of men and materials, as there were no stations or sidings in the vicinity to accommodate the traffic. The Hydro-Electric Board, in consultation with the L.N.E.R., decided that to overcome the difficulty, two stations would have to be constructed, at Inveruglas and Glen Falloch, with additional accommodation for goods traffic at Inveruglas, Glen Falloch being used as a halt. In addition, a further halt had to be constructed at Faslane Junction, near a P.O.W. camp from which most of the labour was obtained in the early stages of the work. Every morning a special train leaves Faslane Junction with P.O.Ws, picks up British workers from the main camps at Inveruglas, and goes on to Glen Falloch, returning to Faslane Junction in the evening.

The bulk of the very large tonnage of goods traffic, including cement, brick, waterpipes, steelwork, and machinery, used in the construction of the £4,500,000 project will be dealt with at Inveruglas. Excavations had to be made there to allow of the construction of sidings to hold the wagons conveying this traffic, and it has been found necessary also to instal a 15-ton crane to assist in unloading.

Rapid Station Construction

The facilities provided at Inveruglas consist of a single platform of standard L.N.E.R. concrete slab construction, with ash filling between the slabs. A goods loop to accommodate two engines, 30 wagons, and van, and a signal box controlling the loop and siding signals, had to be provided to facilitate traffic working; three sidings were laid in to accommodate the contractors' traffic. The signal box is erected on the platform, and a waiting shelter and goods store also are provided. This type of platform enabled the work to be carried out more expeditiously than would have been the case using ordinary walling, about 40 yd. of platform being constructed completely in one week-end shift.

The Glen Falloch platform is of similar construction, and this platform serves as an access to a roadway constructed by the Hydro-Electric Board in connection with

The L.N.E.R. West Highland line in the vicinity of the hydro-electric scheme

the aqueducts to be built among the hills above Loch Lomond as feeders to the main catchment area.

At Faslane Junction, the platform consists of a sleeper wall with ash filling. The standard concrete platform walls can be removed and used elsewhere in the event of the platform not being required once the scheme is completed.

An engineering difficulty was en-

Concrete slab platform construction at Glen Falloch Halt

countered in Inveruglas, as the pipes carrying the water from the tunnel from Loch Sloy, two miles northwest of Inveruglas, down to the power station require to pass through below the railway embankment, involving the construction of a new bridge. The construction of the new underbridge during the operation of railway traffic would have involved imposing a very severe speed restriction while the work was in progress, as well as the construction of temporary service bridges over the excavation for the new abutments and wing walls. In order to avoid this, it was decided to divert the West Highland line at the site on to a temporary embankment on the west side, and so allow construction of the new bridge without interference to traffic. The length of the diversion was about ¼ mile.

The new bridge was constructed by Sir Wm. Arroll & Co. Ltd., and consists of concrete abutments and wing walls, with a steel superstructure of two main girders, cross-girders, and concrete floor; the clear span is 64 ft. The whole of the work was carried out without interference to railway traffic.

This bridge is now in use, and the diversion has been removed except for a portion at the north end which has been left in as siding accommodation for the handling of the materials necessary for the construction of the 7,570 ft. of high pressure pipe lines. The construction of the pipe lines is a major work in itself, and four pipes with outside diameters of 6 ft. 7 in. will be laid on the hillside between the outlet from the tunnel from Loch Sloy, several hundred feet above the L.N.E.R., and carried through below the new bridge to the power station to be situated at Loch Lomond.

Special precautions had to be taken for the safety of the railway during blasting, and a concrete safety wall on the west side of the line is being provided also. The handling of the pipes and the materials will involve the construction of an accommodation railway between the power house and the tunnel outlet.

Mobile V.H.F. Radio Equipment

Telephony transmitting and receiving apparatus suitable for use in railway marshalling yards

Separate Loud-Hailer type of loudspeaker for operation from the transmitter modulating amplifier

IT is expected that licences will be granted in the near future for radio operation on the many vacant channels which exist in the V.H.F. range (that is, in the neighbourhood of 100 Mc/s). The range of communication obtainable is governed partly by the curvature of the surface of the earth, and can be extended by increasing the difference in height between the transmitting and receiving aerials. It is described properly as "optical range," to be distinguished from "visual range," since objects between the transmitter and receiver do not necessarily obstruct communication.

A new mobile V.H.F. installation was demonstrated recently by Marconi's Wireless Telegraph Co. Ltd., when communication was maintained between a car travelling through London from Kingsway to Hyde Park and observers at a fixed station in Kingsway. The mobile equipment consists of separate transmitter and receiver units, which can be installed in any convenient position in the vehicle and operated from a remote-control panel. A send-receive switch incorporated with the Ardente microphone operates relays which transfer the input from the electrical system to the transmitter or receiver as the case may be, and also effect the necessary switching of the aerial connections. The mobile transmitter develops a power of 10 watts. Power supplies for the transmitter and receiver are taken from built-in motor-generators, which run off a 12-volt d.c. input. Both units measure 8 in. × 15½ in. × 7¼ in., and weigh 18 lb.

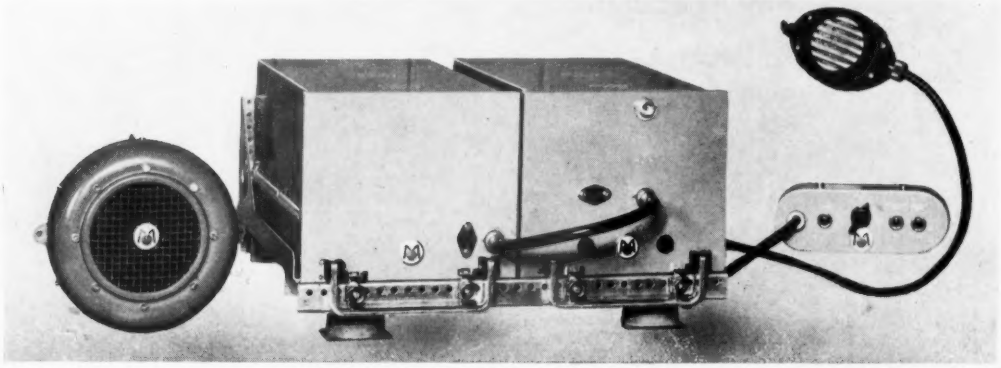
For the purpose of the demonstration on July 25, the fixed station was equipped with a 50-watt transmitter; but the mobile apparatus will serve equally well for use as a fixed station, and in these circumstances can be operated from 230-volt, 50-cycle, a.c. mains. It is pointed out that the 10-watt apparatus provides adequate range for railway purposes, such as used in marshalling yards. When a 50-watt transmitter is used, distances up to 30 miles are covered.

Crystal control is used both for the transmitter and the local oscillator in the receiver. The instruments are designed for working on a single fixed frequency in the 78-100 Mc/s range. Arrangements can be made for causing the transmitter to radiate an audio-frequency tone, which will actuate a light or bell calling signal at the receiving station. Certain additional apparatus is required also for the receiving equipment, and affords a high degree of protection against false calls caused by interference. Two conversions of frequency take place in the receiver, so that the freedom from adjacent channel interference characteristic of the superheterodyne principle is present to a high degree, and the selectivity will be adequate to deal with conditions on the V.H.F. band as more stations are licensed.

The amplifier which modulates the transmitter can be used also for operating an Ardente Loud-Hailer type of loud-speaker. This instrument can be installed with the fixed apparatus at the yardmaster's office in a marshalling yard, and used for broadcasting announcements summoning members of the staff, and so on.

Although no special screening arrangements had been fitted to the car, there was no noticeable interference from its own ignition system, and the ignition of other vehicles in dense traffic was barely noticeable in the car, even when receiving at full volume. The tests were carried out on a frequency of 84·276 Mc/s., corresponding to a wavelength of about 3½ metres. Since a quarter-wave aerial is used, it is of small size and may conveniently be a vertical rod.

Orders for this Marconi apparatus have been received recently from the Home Office for equipping mobile police units, and it is understood that the apparatus is to be used also by the L.N.E.R. and the Belgian Railways for marshalling yard control purposes.



Mobile radio equipment showing, from left to right, loudspeaker, transmitter-receiver unit, control panel, and hand microphone

Railway Assistance for Hydro-Electric Scheme

(See article on page 183)

Diversion of the L.N.E.R. West Highland line at Inveruglas to avoid interruption of traffic during construction of the bridge illustrated on page 183

New station and sidings at Inveruglas, where the bulk of the contractors' traffic is being handled

A New Lightweight Shunting Unit

Petrol-driven pusher for operating on a rail or in the six-foot way

DURING the demonstration of goods-handling appliances given by the Great Western Railway at Westbourne Park on June 4 (see our July 18 issue), wagons were shunted into position before the spectators by a shunting unit of Belgian manufacture, which is in trial service with the company.

The unit, known as the Locopulseur Pulso, is made by the Ateliers de Construction de Jambes-Namur, and consists of a three-wheel chassis, with petrol-engine drive, equipped with handles so that it can be guided by an operator walking behind it.

An adjustable pushing head at the front of the chassis engages with the wagon being propelled, and also transmits some of the weight of the wagon through the main driving-wheel of the unit to the rail, in order to increase adhesion. The driving-wheel is fitted with a high-pressure pneumatic tyre, suitably grooved to fit the rail.

The tyre is barred to increase adhesion, and cut with notches which facilitate crossing rails at right angles. When operating on the permanent way, the two smaller supporting wheels at the rear are not in contact with the ground, but come into use when the unit is being moved from one job to another. The chassis is built of thin welded tubes, the whole machine weighing only a little over 3 cwt.

Easy-Handling Characteristics

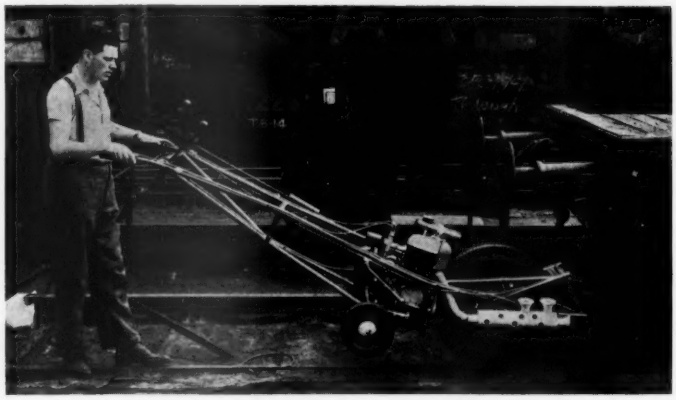
A noticeable feature of the demonstration was the satisfactory balance of the appliance, enabling the operator to guide it with the minimum effort, and also facilitating the process of mounting the rail and taking the weight of the wagon.

The unit is powered by a single-cylinder, 500-cc. four-stroke petrol engine, with air-cooling assisted by a fan. Fuel consumption is about ¼ gal. to ½ gal. of petrol an hour, and the speed of operation varies between 2 and 4 m.p.h., according to the track and the load being handled. In good conditions, depending on the state of the permanent way, the unit will propel a rake of wagons weighing 150 tons gross.

The engine drives the main wheel through a 4-speed gearbox. When the unit is being moved from job to job, a free-wheel device, operative in both directions of movement, enables it to be handled with the engine and transmission disengaged.

Adjustment of the pushing head is made from the handlebars, and provides for varying its height to suit different wagons, and for disengaging it rapidly. There is an automatic release for the wagon if a safe speed is exceeded during propulsion.

The unit has many possibilities for use in small goods yards and private sidings where the provision of a shunting locomotive is uneconomical for the volume of traffic dealt with.



Propelling a wagon with the unit running on the rail

Dividing a rake of wagons from the six-foot way

BIRMINGHAM BRIDGE REBUILDING, L.M.S.R.—A contract has been placed by the L.M.S.R. for the reconstruction of two bridges carrying Navigation Street and Hill Street over the railway near New Street Station. The work will take three years to complete. The new bridge for Navigation Street will be a steel structure of 507 tons and 132-ft. span and it will have a reinforced concrete slab deck. The main girders will be transported to the site in six sections and erected on a closed half of the old bridge. On completion, the first half of the new bridge will be opened to traffic, and the remaining section closed. The new Hill Street bridge, with a concrete slab deck, will have a span of 146 ft., and the steelwork will weigh 393 tons. Until completion, road traffic will be diverted over a temporary bridge, which already is in position alongside. The whole of the old structure will be occupied and used as a base for main-girder erection. The contract has been placed with C. A. Horton Limited, Brierley Hill, Staffs., and the sub-contractors for the steelwork will be Horseley Bridge & Thomas Piggott Limited, Tipton, Staffs.

L.P.T.B. STAFF INDUSTRIAL STUDY VISITS.—The London Passenger Transport Board is to send numbers of its employees abroad and to many parts of Great Britain on special industrial study visits. It is felt by the Board that benefit will result in the running of its services if members of the staffs working them have a chance to learn first-hand about the operation of outside industries. The first two overseas parties, each of twelve members, will leave for Switzerland, and for Sweden and Denmark, next month; among those going are bus drivers and conductors, a railway platelayer, electrical fitters, railway and road inspectors, a coppersmith, and a booking clerk. On the Swiss visit, which lasts a fortnight, members will study railway operation, factories, and hydro-electric plants; the visit to Sweden and Denmark will take two-and-a-half weeks and will specialise in studying road transport. Visits to other countries are to be arranged subsequently. The L.P.T.B. will pay the salaries and wages of the employees while they are away and will bear the whole cost of the visits. More than a hundred other members of London Transport staff will be sent his year on visits to industries in Great Britain.

REOPENING OF G.W.R. HOLBORN VIADUCT OFFICE.—Last Monday, August 11, the G.W.R. reopened for parcels business its Holborn Viaduct office, which was closed during the war. This will relieve the work of the Long Lane parcels office.

RAILWAY NEWS SECTION

PERSONAL

British Transport Commission

Mr. Alfred Barnes, Minister of Transport, on August 8 announced that the following have accepted his invitation to become full-time members of the British Transport Commission:—

Sir Cyril Hurcomb (Chairman) (Secretary, Ministry of Transport).
Lord Ashfield (Chairman, L.P.T.B.).
Mr. John Benstead (General Secretary, N.U.R.).
Lord Rusholme (General Secretary, Co-operative Union Limited).
Sir William Wood (President, L.M.S.R.).

The Minister hopes to announce shortly the appointment of a part-time member drawn from Scotland.

Colonel Sir T. Ellis Robins has been elected a Director of the Beira Railway Co. Ltd., in place of the late Sir Henry Chapman.

Mr. N. J. Amos, who has been Chief Engineer of the Queensland Government Railways since 1930, has retired.

Mr. H. C. Lusty, Chief Engineer, New Zealand Government Railways, is at present studying railway methods in the U.S.A. and Canada.

Mr. C. Cowley has relinquished the Secretaryship of the Antofagasta (Chili) & Bolivia Railway Co. Ltd. and of its associated companies, the Chilian Northern Railway Co. Ltd. and Andes Trust Limited, but is retaining his seat on the boards of those companies. Mr. N. L. Weatherall has been appointed Acting Secretary.

L.M.S.R. Appointments

Mr. F. C. Barrow, Assistant Chief Railway Service Representative (Shipping), Leadenhall Street, London, E.C., to be Chief Railway Service Representative (Shipping) & Associated Humber Lines Representative, London.

Mr. G. E. Cassidy to be Assistant Chief Railway Service Representative (Shipping), Leadenhall Street.

Mr. R. G. Laybourne to be Assistant Chief Railway Service Representative, District Goods Manager's Office, Aldersgate Street.

Transport Arbitration Tribunal

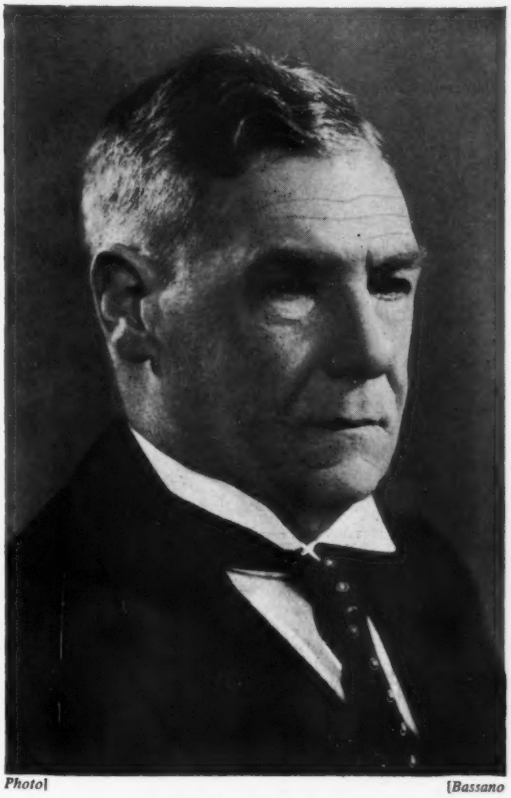
The members of the Transport Arbitration Tribunal, established by section 105 of the Transport Act, 1947, are as follow:—

President of the Tribunal (for proceedings other than Scottish proceedings), appointed by the Lord Chancellor: Mr. C. Montgomery White, K.C.

President of the Tribunal (for Scottish proceedings), appointed by the Lord President of the Court of Session: Mr. C. W. G. Guest, K.C.

Members of the Tribunal, appointed by the Lord Chancellor: Mr. B. G. Catterns, Sir Russell Kettle.

Sir Cyril William Hurcomb, G.C.B., K.B.E., Secretary of the Ministry of Transport, who has been appointed Chairman of the British Transport Commission, was born in 1883, and was educated at St. John's College, Oxford. In 1905 he entered the service of the Post Office in the Surveyor's Department, and in the next year was transferred to the Office of the Secretary. He became Private Secretary to the Permanent Secretary in 1910, and Private Secretary to the Postmaster-General in 1911. He was later Deputy-Director, and subsequently Director, Commercial Services, Ministry of Shipping. He joined the Ministry of Transport on its formation in 1919 as Assistant Secretary in the Finance, Rates & Statistical Department, and he was Secretary of the Ministry from 1927 to 1937. In May, 1937, he was appointed an Electricity Commissioner, and he became Chairman of the Electricity Commission at the end of that year. On the formation of the second Ministry of Shipping in October, 1939, Sir Cyril Hurcomb was made Director-General, and, from the amalgamation of that Ministry and the Ministry of Transport in 1941, served as Director-General of the Ministry of War Transport; since 1946 he has been Secretary to the Ministry of Transport. He will be resigning his office in the Ministry of Transport and the Chairmanship of the Electricity Commission. Sir Cyril Hurcomb was President of the Institute of Transport for the year 1935-36.



Photo] *[Bassano*

Sir Cyril Hurcomb

Appointed Chairman, British Transport Commission

The London Passenger Transport Board gave a dinner at Claridge's Hotel recently in honour of Colonel Sidney H. Bingham, Commissioner, Board of Transportation, New York City, who is on a visit to London to study L.P.T.B. methods. Lord Ashfield, Chairman of the L.P.T.B., presided.

Mr. Cyril G. C. Wayne, who occupies the post of Divisional Assistant on the Buenos Ayres Western Railway, is at present on leave in England. Mr. Wayne was formerly Assistant to the Traffic Manager on the Shanghai-Nanking Railway.

Mr. Rudolph Furrer has been elected Vice-President in charge of Engineering for the American Car & Foundry Company. He succeeds Mr. E. D. Campbell, who recently retired.

Mr. W. Cyril Williams, Export Director of Beyer, Peacock & Co. Ltd., has just returned to England after a business tour which included India, Ceylon, Burma, Malaya, Australia, and the U.S.A.

Among those recently transferred from associate membership to membership of the Institution of Mechanical Engineers are Messrs. T. G. Creighton, Controller of Railway Supplies, Railway Board, India; J. E. Bell, Works Manager, Ashford, C. A. Shepherd, Works Manager (Carriages), Eastleigh, and S. T. Willcox, Technical Assistant for Locomotives, C.M.E. Department, Southern Railway; W. H. Bodman, Staff Assistant to Chief Mechanical Engineer, and A. W. J. Dymond, Assistant to Chief Mechanical Engineer, Great Western Railway; and James Rankin, Works Superintendent (Locomotives), Crewe, L.M.S.R. Those recently elected Members include Messrs. O. G. Hackett, Works Manager, Lancing & Brighton, Southern Railway; and H. G. McClean, formerly Manager, Traction Division, Crompton Parkinson Limited, and now Export Manager, Electro-Motive Division, General Motors Corporation, U.S.A.

Mr. Arthur John Farrant Bunning, C.M.G., General Manager, Nigerian Railway, who, as recorded in our August 8 issue, has been appointed Special Commissioner for Railway Rates (Revision), Nigeria, was born in September, 1895, was educated at Newport (Monmouthshire) High School and Technical College, and entered the Traffic Department of the Great Western Railway early in 1912. He joined the Army soon after the outbreak of war in 1914, and was commissioned in the South Wales Borderers in 1915; after being wounded on the Somme a year later he returned to France as an R.T.O. in 1917. In December, 1918, he was posted to the General Headquarters Railway Traffic Office, Cologne, and a year later to Danzig as R.T.O. in Charge. After a year spent there and on the Inter-Allied Baltic Railway Commission in Poland, he

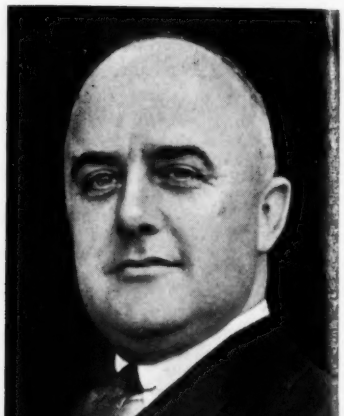
Mr. A. J. F. Bunning

Appointed Special Commissioner for Railway Rates (Revision), Nigeria

Photo] [Ziemsen

Mr. D. C. Woodward

Appointed General Manager, Nigerian Railway



Mr. A. Earle Edwards

Appointed Southern Divisional Superintendent, Southern Railway

returned to the United Kingdom at the end of 1920 and was demobilised. In 1921 Mr. Bunning joined the Eastern Railway Construction of the Nigerian Railway, and in 1927 went over to Open Lines as Assistant Traffic Officer. He was promoted District Traffic Superintendent in 1936. Three years later he transferred to the Gold Coast Government Railway as Traffic Manager. In May, 1942, Mr. Bunning returned to the Nigerian Railway with the appointment of Chief Traffic Superintendent; he never took up that post, however, as on arrival he was promoted Deputy General Manager. He acted as General Manager in April and May, 1943, and again from July, 1943, until his appointment as General Manager in January, 1944.

The Road Transport Advisory Committee of the National Savings Committee is constituted as under for 1947-48:—Mr. Alfred Barnes, M.P. (President); Messrs. E. S. Shrapnell-Smith (Chairman); Harold E. Clay (Vice-Chairman); Edmund Lund (local authorities); H. S. Gordon (L.P.T.B.); W. G. Marks (Municipal Passenger Transport Association); E. G. Wright (National Association of Furniture Warehousemen & Removers); Major H. E. Crawfurd, Messrs. H. T. Dutfield, D. Richardson, Major R. A. B. Smith, Mr. G. W. Quick Smith (National Road Transport Federation); Messrs. F. Hayday (National Union of General & Municipal Workers); F. J. Speight (Passenger Vehicle Operators Association); J. S. Wills (Public Transport Association); J. Paterson, Roger W. Sewill (Road Haulage Association); C. Smith (Traders Road Transport Association); J. E. Corrin, F. Coyle (Transport & General Workers Union).

Mr. D. C. Woodward, Traffic Manager, Nigerian Railway, who, as recorded in our August 8 issue, has been appointed General Manager, was born on March 15, 1902, and was educated at St. Peter's Court, Broadstairs, and Christ's Hospital, Horsham. He joined the L.N.W.R. in 1918 as a probationer, and, after experience in every branch of the Passenger, Goods and Operating Departments, was appointed District Runner at Swansea, L.M.S.R., on the Central Wales lines. Mr. Woodward left the L.M.S.R. in 1928 to take up the appointment of Assistant Traffic Superintendent, Nigerian Railway, on which he was promoted District Traffic Superintendent in 1938 and Senior Traffic Assistant in 1942. He was appointed Chief Traffic Superintendent (now designated Traffic Manager) in 1945, and in 1946 he acted as General Manager while the latter was on leave.

Mr. A. Earle Edwards, M.Inst.T., who, as recorded in our August 1 issue, has been appointed Southern Divisional Superintendent, Southern Railway, was born in 1901, and joined the S.E.C.R. in 1917. In 1928 he was selected as a cadet, to undertake a four-year course of training in all departments of the Southern Railway, which included four months with the Underground Railways group. He was appointed Assistant Western Divisional Superintendent at Exeter Central in 1931, and Senior Assistant Divisional Superintendent there in 1934, and was a Director of the Sutton Harbour Improvement Company at Plymouth from 1934 to 1940, and a member of the Exeter & District Traders' Panel. At the outbreak of war he was temporarily transferred to Southampton as Acting Assistant Divisional Superintendent, returning to Exeter in May, 1941. In September, 1943, Mr. Earle Edwards went to Deepdene Headquarters as Acting Assistant for Train Services to the Superintendent of Operation; in 1944 he was appointed Acting Assistant for Planning to the General Manager, and represented the Southern Railway on the Railway Companies' Association Commission for Post-War Planning. In October, 1944, he was transferred to Woking as Senior Assistant Divisional Superintendent (London West Division), which position he vacates on his new appointment. Mr. Earle Edwards was Chairman of the committee of the Metropolitan Graduate & Student Society of the Institute of Transport in 1930, and is now a member of the committee of the newly-formed Metropolitan Section. He holds a number of London University (School of Economics) diplomas, and has visited many Continental countries to study the working conditions of railways and other forms of transport.

INSTITUTE OF TRANSPORT AWARDS

The Council of the Institute of Transport has authorised the following awards in respect of papers submitted during the session 1946-47 and in respect of the 1947 examinations:—

Railway Companies' Association Awards: (i) £40 to Mr. J. R. Pike, M.Inst.T. (Assistant Chief Commercial Manager, L.M.S.R.); (ii) £40 to Mr. A. E. Sewell, M.Inst.T. (Railway Chairman, Road & Rail Central Conference); (iii) £10 to Mr. R. L. F. Woodhouse (Graduate) (Assistant to Traffic Manager, Arthur Guinness, Son & Co. Ltd.).

Road Transport (Passenger) Medal: Medal and £15 to Mr. Charles E. Lee, A.M.Inst.T. (Associate Editor, *The Railway Gazette*).

Bristol & White Smith Student Prize: £10 to Mr. K. B. Crosby (Student).

Dock & Harbour Authorities' Association Awards: (i) £15 to Mr. W. A. Flere, A.M.Inst.T. (Port of London Authority); (ii) £5 to Mr. A. F. Hares (Graduate) (Port of Bristol Authority).

Sir Alfred Read Examination Prize: £25 to Mr. R. I. Cowan (Graduate) (Ed. Nicholson Limited).

Inland Waterway Carriers' Award: £10 to Mr. Alfred Hayman (Student) (Manchester Ship Canal Company).

"Modern Transport" Award: £5 to Mr. A. G. Yates (Graduate) (Assistant Transport Manager, Aplin & Barrett Limited).

Institute Shipping Award: £15 to Mr. C. H. Minett, A.M.Inst.T. (Manager, Legal & Claims, Gray, Dawes & Company).

Institute 1944 *Award*: £15 to Mr. L. D. Kitchin, A.M.Inst.T. (Assistant Editor, *Motor Transport*).

Graduate Award: £15 to Mr. J. H. C. Payne (Graduate) (lately of the L.P.T.B.).

Student Award: £10 to Mr. K. J. Lee (Student) (L.N.E.R.).

Associate Membership Examination Prizes: (i) £20 for first place to Mr. W. H. Stebbings (Graduate) (G.W.R.); (ii) £10 for second place to Mr. W. Lawrence (Graduate) (Aberdeen Corporation Transport).

Graduateship Examination Prizes: (i) £10 for first place to Mr. W. A. Lake (Student) (T. Roddam Dent & Sons Ltd.); (ii) £5 for second place to Mr. D. J. Wilkinson (Student) (Middlesbrough Transport & Engineering Co. Ltd.).

Accidents on British Railways, 1946

The annual report* for 1946 of the Chief Inspecting Officer of Railways (Lt.-Colonel Sir Alan Mount, C.B., C.B.E.), shows that train accidents during the year resulted in the deaths of 34 passengers and nine railway servants. Of the passenger fatalities, 20 occurred at Lichfield, 10 at Browney, two at Potters Bar, one at Catford, and one at Stafford. The fatality rate amongst passengers was one in nearly 1,000 million miles of travel. Train accidents of all kinds numbered 1,237. Human failure accounted for 526, and defective rolling stock, track, or apparatus, for 180.

In movement accidents other than train accidents, 86 passengers were killed as compared with an average of 111 for the period 1940-45. Of this total, 66 fatalities occurred through falls from platforms and trains and when entering or alighting from trains. The principal causes of these accidents were misadventure and carelessness or misconduct on the part of passengers themselves. In addition, 227 railway servants were killed.

Fatalities in all movement on rail, including train accidents, totalled 413, which is lower than in any of the six previous years, and nearly 23 per cent. lower than the 1941 peak of 534. On the other hand, the figure was still considerably higher than the pre-war average of 338 for the period 1935-39. This was mainly due to increases in movement accidents among both passengers and railway servants. The total fatalities among the latter amounted to 236, and injuries to 3,281.

The 151 fatalities among railway servants when working, walking, and standing on the permanent way, were 10 fewer than in 1945, but they are again the worst feature in the year's figures, and compare with the average of 114 for the period 1935-39. The Chief Inspecting Officer expresses the hope that action being taken by the railways will correct this, though the prospect of substantial improvement lies mainly in the exercise of greater individual caution. Moreover, statistics show that, besides the considerable changes in personnel, which were, perhaps, responsible, a number of casualties occurred amongst men of long experience.

A Difficult Year

The report states that the year 1946 was difficult and disappointing. Little if any headway was made in overtaking arrears of maintenance, and it was broadly a case of continuing the policy of "make do and mend." Recovery was impeded by shortages of material and labour. Examples affecting speed and safety of operation were that, by the end of the year, arrears of renewals of rails in running lines increased to about 400,000 tons, and of sleepers to 10 millions. The labour position also was affected by the retirement of many skilled personnel who had remained in service beyond their normal time. Maintenance of power became increasingly difficult as the year went on, through continued heavy usage and retention in service of engines which in the ordinary course should have been scrapped; failures in traffic were more frequent, and the congestion and delays tended to increase liability to accident.

The Chief Inspecting Officer states that the run of exceptional accidents early in 1946 at Lichfield, Browney, and Potters Bar cannot be ascribed to any general or remediable cause; but the derailments at Catford, Marshmoor, Garstang, and By-

* H.M. Stationery Office, price 9d.

fleet in the latter half of the year showed that the delayed effects of permanent way maintenance arrears were being felt to an increasing degree. It thus became necessary to take the unusual step of imposing special speed restrictions, and unfortunately there appears to be little hope of a return in the near future to pre-war standards of operation, for which British railways have been such an efficient instrument.

Passenger travel on the four main-line systems, as represented by journeys, though 7 per cent. less than in 1945, was some 2 per cent. greater than in 1938. Although the higher volume was conveyed by about 18 per cent. fewer passenger train-miles than in 1938, it is estimated that passenger-miles increased by 10,000 millions, or over 50 per cent., as compared with the 12 months ended August, 1939. There was heavier loading and overcrowding, and the average distance travelled per passenger also increased by 50 per cent. Shortage of coal led to still further curtailment of services at the end of the year, and this continues. Freight traffic remained at a high level, only 2 per cent. below 1945, despite the embargoes on acceptance in the autumn, caused by shortages of power and wagons. Freight train-mileage remained at about 2 per cent. above pre-war, and net ton-miles were 27 per cent. more than in 1938, or, on the average, about 10 millions more per week-day.

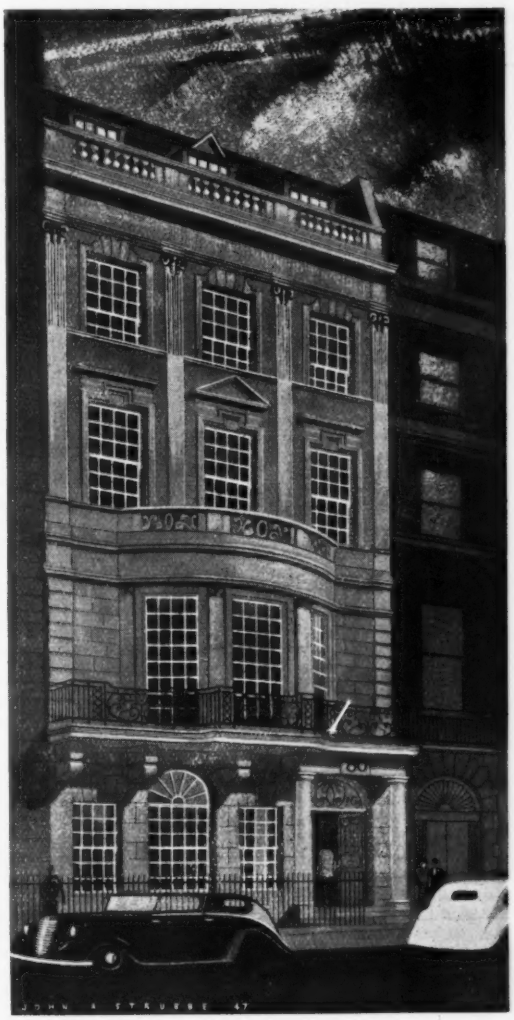
The Chief Inspecting Officer ends his report by stating that, notwithstanding the conditions which prevailed in 1946, the conclusion is justified that a high order of safety resulted from the care exercised in operation. Comparison with the six years 1940-45 is favourable; but the standards of the years before the war, when track and equipment were at the height of their efficiency, have not yet been restored.

The deterioration has been due to intensive use for war purposes, coupled with shortages of all kinds, which still continue, and if even the present degree of safety is to be maintained, operating efficiency may have to suffer increasingly from speed restriction. Materials and manpower are the limiting factors, and the whole economy of the country will suffer if the railways are allowed to run down any further. The hope is expressed that present shortages will prove to be only a passing phase, in order that pre-war standards of efficiency, speed, and safety may be regained.

The report contains summarised tables for the past 32 years which give the total casualties from all movement on rail, with information about traffic carried and staff employed; the report also gives the relations between fatalities in train accidents, the number of passengers carried, and the number of train-miles worked.

Mond Nickel Research and Advisory Services.—Many years of work by the Development & Research Department of the Mond Nickel Company has resulted in an accumulation of technical data on the properties and applications of nickel and nickel alloys. The company plans to call special attention to this part of its work at the Engineering & Marine Exhibition which opens at Olympia, London, on August 28. To assist visitors, members of the Mond Nickel Company staff will be present to advise on all metallurgical problems, and they will welcome, also, the opportunity of discussing the improvements in materials and technique developed to meet war needs, but which are available to all branches of industry now for post-war development.

New Headquarters for Institute of Transport



The above premises, 80, Portland Place, London, W.1, the lease of which has been purchased by the Institute of Transport, will be its new headquarters (*see last week's issue, page* 141)

Ministry of Transport Accident Report

Byfleet, Southern Railway: December 27, 1946

Colonel A. C. Trench, assisted by Brigadier C. A. Langley, inquired into the accident which occurred at about 4.31 p.m. on December 27, 1946, at Byfleet, Southern Railway, when the 2.20 p.m. train, Bournemouth to Waterloo, composed of 12 bogie coaches drawn by 4-6-0 (" Lord Nelson " class) engine No. 851, and travelling on the up through line at about 60 m.p.h., became completely derailed.

Although there was a fair amount of damage, all coaches remained more or less upright and in line. Out of a well-laden train, only three passengers received injuries, two being removed to hospital. The adjacent up local and down through tracks were both fouled, but after a brief delay traffic was able to pass under hand signalling on the down local.

The up through track was completely destroyed for 315 yards. It was dusk and not actually raining, but the rail was probably wet. The line falls at 1 in 500 towards Waterloo at the point of derailment and is in cutting for 1,400 yards approaching Byfleet. About the middle of the cutting is an overbridge which limits the possibilites of lifting the track to any appreciable extent.

The Course of Events

From 3.35 p.m. to the time of the accident, five trains, one a fast electric, had passed on the up through at speeds varying from 40 to 65 m.p.h., but no engineman or guard noticed any irregularity in the track or in the running in the cutting, neither did the signalman, who has a good view, notice any unusual rolling or other motion.

The driver of the derailed train found Byfleet distant signal against him, but it cleared before he reached it, and he decided not to pick up above 60 m.p.h. The engine seemed to him to go down on to the ground approaching the home signal. He thought the back of it went down first, and the bogie wheels may have remained on the rails for some time after the initial derailment of the driving wheels. The vacuum was going, so he closed the regulator and waited for the engine to come to a stand. The guard noticed no lurching or rolling beforehand.

The signalman thought the express was running normally at the over-bridge, but just before it reached a crossover, which has a slip to the up through some 77 yards in rear of the box, he saw a flash, then several more. The engine seemed to be coming straight towards the box, but remained in the 6 ft. way and stopped about 40 yards past it.

Inspection of Track

The Permanent Way Inspector carried out a series of inspections, arriving at Byfleet during the morning. He checked the crossovers there, and walked along the up through to the overbridge, checking gauge and level at one or two places. He saw no necessity to " eye " the track, but watched one or two trains passing and was satisfied that it was in good order. He told the ganger to attend to one or two pumping sleepers on the up through and up local.

The ganger had examined the up through at 7.20 a.m., noticing nothing unusual, and in the afternoon instructed the sub-ganger to pack the loose joints noticed by the inspector. The sub-ganger spent most of the afternoon on the up local, but attended to a bad joint on the up through, and two or three other loose sleepers. He did not put more than a couple of scoops of ballast under each sleeper, but watched a train pass and was satisfied. He checked gauge and cross-level, considered them satisfactory, and reported accordingly.

The Permanent Way

The up through has 95-lb., 45-ft. rails, with 4-bolt fishplates and steel spring keys. The chairs have two through bolts. The rails were renewed in 1919, but are still of good profile. A sample was found to weight 90·8 lb. The line was re-sleepered in 1942, and there were no signs of chair movement or gauge spreading. Ballast was Meldon granite to a depth of 4 ft. 6 in. below sleepers, with 3 or 4 in. dirty sand and 4 to 5 ft. hard sand, with slight mixture of clay.

A piped drain on the north of the cutting had water running freely on the following morning; in an open ditch on the south, water was hardly moving. Some cable manholes had water at a depth of 12 to 15 in. below rail level. There had been a good deal of rain for some time, and snow had been lying for some days. The ganger found the length wetter than usual since the snow melted.

The ballast was dirty and tended to hold water, and there were no permanent cross-drains. Ballast had been cleared between some sleepers to improve cross-drainage, and this had been done for some five rail-lengths before the first marks of derailment, but both inspector and ganger were positive that the sleepers there were resting on a solid foundation. They had been opened out for several days. A mud film showed that some of the sleepers recently had been pumping.

The ganger considered his men to be thoroughly familiar with measured shovel packing, in use for the last two years in the area, but the stone chippings originally supplied were comparatively soft and tended to crush. A harder stone has since been supplied, but there probably was a good deal of soft stuff crushed into mud in the general body of the ballast.

The inspector, in charge since 1939, had found no particular difficulty in maintaining tracks in Byfleet cutting, a statement supported by records, nor had he had complaints of bad running. He last travelled, either on the footplate or in a motorman's cab, on up and down through on three days in September and October. Track was good for line and level, and, he thought, fit for speeds up to 90 m.p.h.

A Hallade record on December 9, 1946, indicated a moderate degree of lateral oscillation through the cutting, with a patch of vertical oscillation at the Byfleet end. Before the track was reconditioned after the derailment, detailed cross-level measurements were taken, and voidmeter readings under load (see diagram). In a length of 20 ft., two rails back from the point of derailment, there was a change of cant from right-hand rail ½ in. low to left-hand rail 1 in. low. These readings, unloaded, must have been accentuated materially under load. The voidmeter indicated many voids from ¼ in. up to ½ in. in 200 yards immediately preceding the point of derailment.

The actual marks on the rails were as indicated on the drawing, their special features being that there was no sign of climbing on either rail, the pairs of flange marks being wide to gauge, so that neither pair could have been caused by the two wheels of any one axle. The engine stopped derailed to the left, and as the initial marks indicated derailment to the right, Colonel Trench considered it reasonable to assume that the trailing cross-over led to this result.

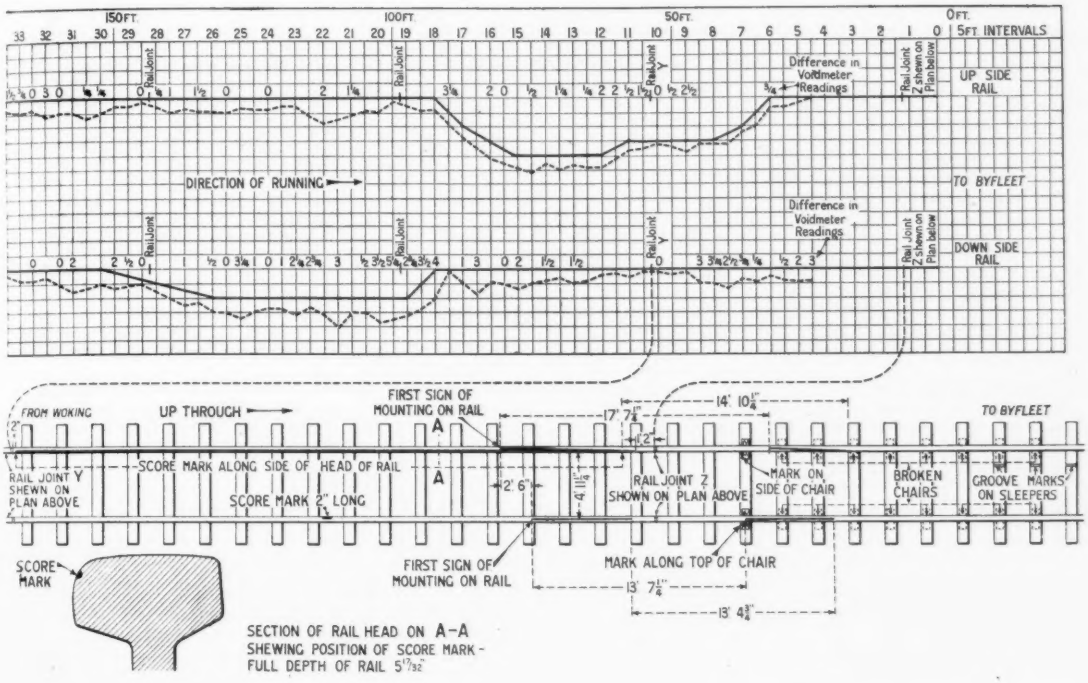
The locomotive after derailment at Byfleet, Southern Railway

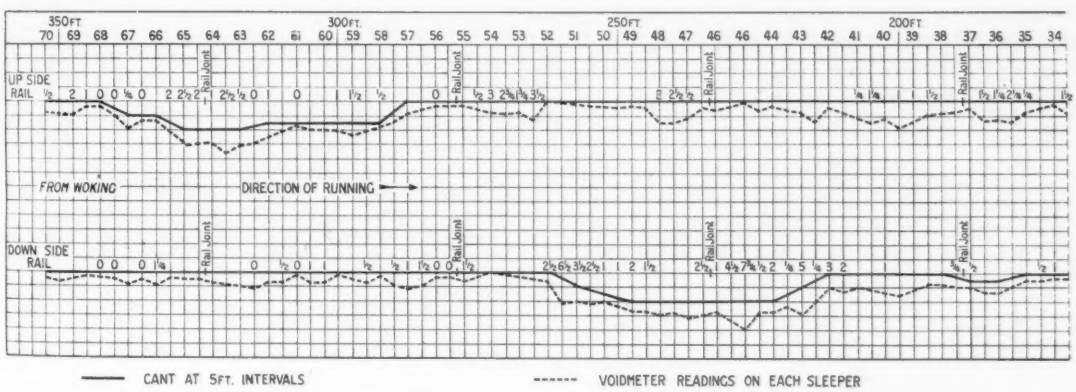
The Locomotive

The locomotive was built in 1927, and left Eastleigh works after general repairs on November 3, 1946, since when it had run about 2,800 miles. Wheel hammer blow of the driving axle is 1·53 tons and axle blow 1·278 tons; the whole hammer blow is 2·98 tons, calculated at 60 m.p.h. The " King Arthur " class engines, hauling three of the preceding trains, have lower axle weights, but the wheel hammer blows for each axle are slightly greater, being, for the driving axle, 1·92 tons, with axle hammer blow of 2·38 tons; and total engine blow 6·12 tons, calculated at 65 m.p.h.

Colonel Trench found nothing in the design of, or damage sustained by, the engine to lead him to think there was any

Byfleet Derailment, Southern Railway





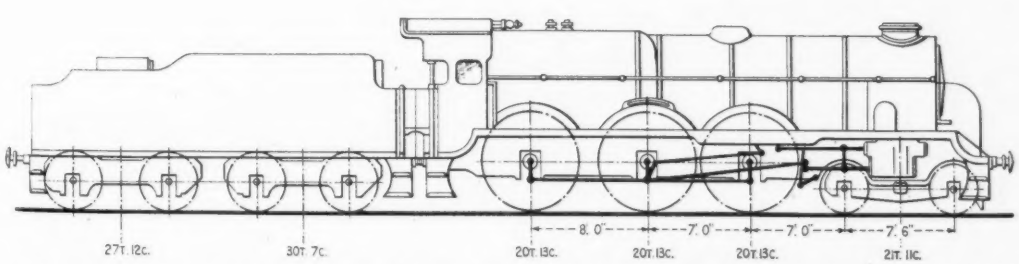


Diagram showing condition of track and other details of the Byfleet derailment on December 27, 1946

defect in it that could have contributed to the accident.

Colonel Trench considers that the permanent way indicated defects of a magnitude sufficient to have caused the derailment, which may be attributed to rapid and alternate transfer of weight from one side of the engine to the other, as a result of abrupt changes in cross-level. In this way, one or more of the coupled wheels were lifted to the head of the rail, finally leading to total derailment. It is also possible that liability to lift was accentuated by the fortuitous synchronism of an upward wheel hammer blow.

The fact must be noted, however, that within the previous hour five trains had passed, at least two at substantially higher speed, with engines of similar axle load and much larger hammer blow, yet none of them had been derailed, nor had their enginemen noticed any unusual defect in the track. Permanent way staff had watched the track under passage of some of the trains and considered it in good condition.

Colonel Trench considers it reasonable to assume that the serious irregularities which brought about the derailment were not present when the previous train passed, their sudden development being a noteworthy feature of the case. From his own experience of the ground in the immediate vicinity, the layer of hard sand and clay under the track is liable to be, in some places, resistant to penetration by water, and in the absence of satisfactory cross-drainage there is considerable chance of pockets of water forming and a tendency for them to remain as soft spots for some time before draining away.

" It is not too speculative to suggest," says the report, " that the normal condition of rolling and of hammer blows which would have accompanied the passage of the ' King Arthur ' engine of the previous train, only five minutes earlier, at 65 m.p.h. might have coincided with soft spots of this nature under the track, resulting in the sudden development of the abnormal irregularities of cross-level in the rails."

Colonel Trench found it difficult to appreciate why the cross-level differences were not noticed, and they were reproduced (unloaded) on a siding to enable him to determine how conspicuous they were.

He found that even abrupt changes might not be noticeable in the winter afternoon light to a man walking along the track, but could not be missed if he bent down to eye it from rail level. These experiments reinforced his view that " these extreme track irregularities could have arisen only at the last moment prior to the derailment, and must, therefore, have been caused, or at any rate greatly accentuated, by the passage of the last preceding train."

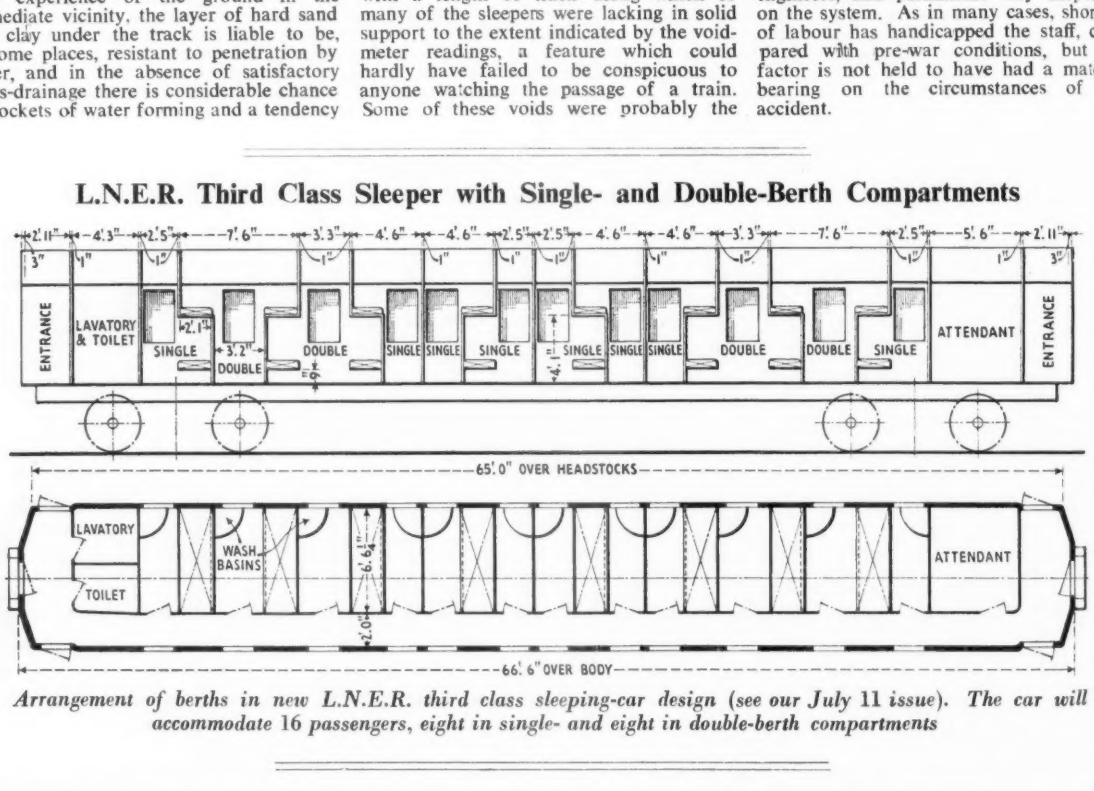
He also found it difficult to understand how the staff could have been " satisfied with a length of track along which so many of the sleepers were lacking in solid support to the extent indicated by the void-meter readings, a feature which could hardly have failed to be conspicuous to anyone watching the passage of a train. Some of these voids were probably the partial origin of the final and serious differences in cross-level to which the derailment was immediately attributable."

Colonel Trench concludes, therefore, that responsibility must be attributed to inadequate appreciation by that staff of the difficulty of satisfactory maintenance of the track in this cutting, under the exceptionally severe conditions of rainfall and melting snow which prevailed at the end of 1946, and the special importance of facilities for cross-drainage from the two centre tracks. More careful observation of the effects of the passage of trains should have drawn attention to the fact that a considerable number of sleepers were lacking in solid support, some to a very serious degree.

Nevertheless, Colonel Trench has no recommendation to make, the company having undertaken a very comprehensive scheme of reconstruction of the formation. On both through lines, rails and sleepers have been removed over a series of week-ends, the old ballast cleared away, and about 12 in. of new provided on a blanket of 3 in. of fine stone chippings. A new concrete trough drain is being provided between up and down through tracks.

The track conditions there have been the subject of special discussions between the Chief Civil Engineer, all divisional engineers, and permanent way inspectors on the system. As in many cases, shortage of labour has handicapped the staff, compared with pre-war conditions, but this factor is not held to have had a material bearing on the circumstances of this accident.

L.N.E.R. Third Class Sleeper with Single- and Double-Berth Compartments



Arrangement of berths in new L.N.E.R. third class sleeping-car design (see our July 11 issue). The car will accommodate 16 passengers, eight in single- and eight in double-berth compartments

INDUSTRIAL MEASURING INSTRUMENTS.—Among the exhibitors at the Engineering & Marine Exhibition at Olympia will be Smiths Industrial Instruments Limited. This firm, which, with its associated companies, A.T. Instruments Limited and David Harcourt Limited, forms the Industrial Instrument Division of S. Smith & Sons (England) Limited, will be showing an extensive range of instruments for marine and general engineering purposes, and a number of working exhibits will give added interest to their display. Prominent among these will be a wide selection of A.T. magnetic indicators, available for practically every form of speed indication, and A.T. hand tachometers, which will give accurate r.p.m. readings instantly from any rotating part of a machine, and ft./min. or meters/min. readings of belts or revolving parts. David Harcourt products will include pressure, vacuum, and compound gauges, available in a variety of sizes. These gauges are available with calibrations to meet any need.

HUNSLET LOCOMOTIVES FOR SIERRA LEONE.—Three 2-6-2 tank locomotives recently shipped by the Hunslet Engine Co. Ltd., Leeds, to the 2 ft. 6 in. gauge Sierra Leone Railways, were designed to shunt the heavy freight trains brought into Freetown by Garratt main-line locomotives, and at the same time keep within an axle load of 4½ tons and negotiate 2-chain curves. These three Hunslet engines, which weigh 21¼ tons and have a tractive effort of 7,500 lb., have 10¾-in. by 15-in. cylinders, and 160-lb. boiler pressure.

Parliamentary Notes

Transport Bill

The Royal Assent to the Transport Bill was given in the House of Lords on August 6.

L.N.E.R. Bill

The Lords' amendments to the London & North Eastern Railway Bill were considered by the House of Commons on August 4 and agreed to. The Bill received the Royal Assent in the House of Lords on August 6.

L.P.T.B. Bill

The London Passenger Transport Board Bill, with amendments, was read the third time in the House of Lords on August 5. The Lords' amendments to the Bill were considered by the House of Commons on August 7 and agreed to.

Questions in Parliament

"A" and "B" Licences

Mr. John Parker (Dagenham—Lab.) on July 21 asked the Minister of Transport how many applications for "A" and "B" licences, respectively, had been made in each of the last six quarter-years for which figures were available; in how many cases had the grant of such licences been opposed by a railway company; and how many licences had been granted.

Mr. Alfred Barnes (Minister of Transport): I regret that quarterly figures are not available. The most recent annual figures are for the year ended September 30, 1938, and I will circulate a statement giving some relevant statistical information in respect of that year.

Later, Mr. Barnes circulated the following statement:—

The figures of applications for "A" and "B" currency carriers' licences and variations for the year ended September 30, 1938, are as follow:—

	Total applications (all traffic areas)	Total granted
"A" currency licences and variations ...	8,385	6,783
"B" currency licences and variations ...	39,657	36,855

Figures in respect of applications objected to by the railway companies are not available for the North Western and East Midland Traffic Areas. The figures for the remaining ten traffic areas for the year ended September 30, 1938, are as follow:—

	Applications (10 traffic areas)	Granted	Objected to by railway companies
"A" currency licences and variations ...	6,289	5,157	2,007
"B" currency licences and variations ...	30,658	28,519	3,864

Cheap-Fare Facilities

Mr. W. Teeling (Brighton—C.) on August 4 asked the Minister of Transport whether he was aware that the regulations allowing reduced fares and reserved accommodation only applied to Tuesdays, Wednesdays, and Thursdays during the summer, which particularly hit the working boys' clubs of Brighton and elsewhere who went camping and could only start their holidays during the week-end, as distinct from those still at school who could leave any day of the week; and whether he would consider making special concessions for working boys and girls.

Mr. Alfred Barnes stated in a written answer: I regret that the restoration of these week-end cheap-fare facilities is not possible at present because the depleted railway resources are insufficient to handle the traffic that would result.

London—Glasgow Train Stop

Mr. Niall Macpherson (Dumfries—Lib. Nat.) on August 4 asked the Minister of Transport on how many occasions in the past two months the 11.35 p.m. train from London (Euston) to Glasgow (St. Enoch) had stopped at, or just outside, Dumfries Station.

Mr. Alfred Barnes, in a written answer, stated: Seventeen.

E.C.I.T.O.

Major Guy Lloyd (East Renfrew—C.) on July 24 asked the Chancellor of the Exchequer what contributions had been paid by the United Kingdom and the other contributories to the European Central Inland Transport Organisation, and whose contributions in any period still remained unpaid.

Mr. Glenvil Hall (Financial Secretary to the Treasury): I will circulate this information.

Major Lloyd: While I realise that the information may be of a lengthy character, would the Financial Secretary give this assurance? In view of the long-continued and all too successful efforts to sabotage this most invaluable international organisation by the deliberate repudiation of their obligations by Soviet Russia and some of her satellites, would the Minister ensure that, in order to safeguard the future of this organisation, which has had to dismiss many hundreds of invaluable employees and is almost made bankrupt, at the next meeting, on July 29, a public session is held, in order that those who have subscribed to this great international organisation may know the reason for its collapse?

Mr. Glenvil Hall: The financial position of this organisation is one of the main items put down on the agenda for the special meeting of the organisation to which Major Lloyd referred. I have no doubt that what he has said will be read by those in charge. Later, Mr. Hall circulated the following information:—

CONTRIBUTIONS BY MEMBER GOVERNMENTS TO THE EUROPEAN CENTRAL INLAND TRANSPORT ORGANISATION (position as at June 30, 1947)

Estimated annual budget: £320,000

Member	Annual contribution	Percentage of total	In arrears 1945–46	Outstanding 1946–47
	£		£	£
Belgium	11,520	3·60	Nil	Nil
Czecho-Slovakia ...	13,984	4·37	Nil	Nil
Denmark	1,728	0·54	Nil	Nil
France	62,496	19·53	Nil	Nil
Greece	576	0·18	Nil	Nil
Luxembourg ...	384	0·12	Nil	Nil
Netherlands ...	11,328	3·54	Nil	Nil
Norway	1,152	0·36	Nil	Nil
Poland	23,008	7·19	Nil	12,947
U.S.S.R.	62,496	19·53	20,496	62,496
United Kingdom ...	62,496	19·53	Nil	Nil
U.S.A.	62,496	19·53	Nil	Nil
Jugoslavia	6,336	1·98	Nil	3,536
	320,000	100·00	20,496	78,979

The percentages and amounts are the same for the two financial years 1945–46 and 1946–47
The Organisation's budgetary year runs to September 30

Inaugural Trip of the G.W.R. Steamer "St. David"

The above group, taken during a courtesy visit of the steamer "St. David" to Cork, which was reported in our issue of August 1, shows (left to right) The Earl of Dudley, Deputy-Chairman, G.W.R.; Sir James Milne, General Manager; Captain J. J Kelly, Master of the "St. David"; and Mr. W. M. Codrington, The Hon. A. W. Baldwin, and Sir Edward C. G. Cadogan, Directors, G.W.R

Photo] ["*Cork Examiner*"

Notes and News

Motor Vehicles (Construction & Use) Regulations.—The Minister of Transport has made the Motor Vehicles (Construction & Use) (Amendment) (No. 2) Regulations, 1947 (S.R. & O. No. 1623).

L.N.E.R. Locomotive Contracts.—The L.N.E.R. has placed contracts with Robert Stephenson & Hawthorns Limited for the construction of 35 Class "L1" 2-6-4 tank engines, and a like number of the same design with the North British Locomotive Co. Ltd. A contract has also been placed with the latter firm for the construction of 70 Class "K1" 2-6-0 locomotives.

Road Accidents in June, 1947.—The return issued by the Ministry of Transport of the number of persons reported to have died, or to have been injured, as a result of road accidents in Great Britain during the month of June last, shows 386 deaths (compared with 412 in June, 1946), 3,422 seriously injured (compared with 3,036 in June, 1946), and 11,919 slightly injured (compared with 10,384).

Temporary Engineering Assistant Required.—A temporary engineering assistant is required by the London Passenger Transport Board in the office of the Signal Engineer, for the design section of the drawing office. Applicants should be not more than 30 years of age and should be in possession of a Higher National Certificate in Mechanical Engineering or an equivalent qualification. See Official Notices on page 195.

New Spur at Stevenston, L.M.S.R.—A new spur at Stevenston, Ayrshire, opened on June 16, affords relief to the Winton Pier, at Ardrossan, by providing a route from Glasgow (St. Enoch) to the Montgomerie Pier, which is used by the steamers to Belfast and the Isle of Man. Until 1939, the trains to and from Glasgow in connection with these boats used the route of the former Caledonian Railway, *via* Lugton, but, during the war years, this line was used for local goods traffic only, south of Uplawmoor, and extensive repairs to the permanent way are necessary before this section can be re-opened to passenger traffic. The new spur is 34 chains long, and was authorised under the L.M.S.R. Order Confirmation Act, 1946. It is remarkable as the first line in Scotland built by the company for which an Act was required.

White Pass & Yukon Railway Company.—Meetings have been called for September 26 to consider a scheme of arrangement modifying the rights of holders of the 5 per cent. consolidated mortgage debenture stock and the 6 per cent. income debenture stock of the White Pass & Yukon Railway Company.

Improved Service Between England and Cork.—The arrival and departure times at Fishguard of the Fishguard-Cork steamer have been altered to provide a quicker service to and from Ireland. Passengers from London leave Paddington Station at 11.35 a.m. on Tuesdays, Thursdays, and Saturdays, and arrive at Cork at 8 a.m. the next day. Return passengers leave Cork at 5 p.m. on Mondays, Wednesdays, and Fridays, and are due at Paddington at 11.55 a.m. the next day.

Southern Railway Boat Trains.—As from August 10, British time has coincided with French and Belgian time, and in consequence, the Southern Railway Continental passenger services have been amended to leave London (Victoria) one hour earlier, so as to ensure connection with trains at the Continental ports. Steamers from Folkestone, Dover, and Newhaven in connection with these services also leave one hour earlier, and the corresponding services from the Continent are similarly affected.

Saunders Valves at Olympia.—In addition to a wide range of diaphragm valves, designed to handle the more difficult fluids as well as air and water, the Saunders Valve Co. Ltd., Cwmbran, Newport, Mon., will be showing at the Engineering & Marine Exhibition, which opens on August 28 and closes on September 13, various recent developments, including an air-motor operated valve and a self-closing valve. These two developments, with compressed air universally available, provide engineers with a ready means of power control where manual operation is inadequate, and also a convenient method of remote control where direct manual operation is awkward or unsuitable. Six models from the range of Safran centrifugal pumps will be shown.

Murrow Station (L.N.E.R.).—On and from Monday, September 1, parcels, milk, and other miscellaneous traffic charged at rates applicable to passenger train or other similar service, and merchandise, etc., con-

Holiday Crowds at Paddington Station, G.W.R.

The queue in Westbourne Terrace, outside Paddington Station, G.W.R., on the morning of Saturday, July 26, when rail travel from all London termini was very heavy

British and Irish Railway Stocks and Shares

Stocks	Highest 1946	Lowest 1946	Prices Aug. 12, 1947	Prices Rise Fall
G.W.R.				
Cons. Ord.	61¼	54¼	54¼xd	—
5% Con. Pref. ...	126½	107	116 xd	+ 1
5% Red. Pref. (1950)	106½	102¼	98¼xd	— 1¼
5% Rt. Charge ...	140¼	122¼	128½	— 1½
5% Cons. Guar. ...	137½	118½	126½xd	— 1
4% Deb.	129½	106	118½	—
4½% Deb.	129½	107	118½	—
4½% Deb.	130½	114	120½	—
5% Deb.	142½	125	130½	—
2½% Deb.	95½	81½	88½	+ 1
L.M.S.R.				
Ord.	30½	26½	27½xd	—
4% Pref. (1923) ...	64	52½	58xd	+ 1½
4% Pref.	86	75½	79xd	+ 1½
5% Red. Pref. (1955)	105½	97	96½	+ 1½
4% Guar.	108½	100	99xd	+ ½
4% Deb.	120	103	109½	+ 1
5% Red. Deb. (1952)	108½	105½	101½	—
L.N.E.R.				
5% Pref. Ord. ...	7	5	6½	+ ½
Def. Ord.	3½	2½	3½	—
4% First Pref. ...	59½	50½	54	+ 2
4% Second Pref. ...	29½	25½	27½	+ 1½
5% Red. Pref. (1955)	104	97	94½	—
4% First Guar. ...	107	98	97½	+ 1
4% Second Guar. ...	101	90	92½	+ 2
3% Deb.	104	87½	95	+ ½
4% Deb.	119½	102½	109	+ ½
4½% Sinking Fund Red. Deb. ...	107½	101½	99½	— 1
SOUTHERN				
Pref. Ord.	79½	70	71½	+ 1
Def. Ord.	24	19½	22¾	+ 1
5% Pref.	125½	107	114½xd	—
5% Red. Pref. (1964)	115½	106½	106½xd	— 1
5% Guar. Pref. ...	137½	119	126½	— 1
5% Red. Guar. Pref. (1957)	115½	107½	105½xd	— 2
4% Deb.	129½	105½	118½	—
5% Deb.	139½	125½	128½	—
4% Red. Deb. (1962-67)	113½	104½	104½	— 1
4% Red. Deb. (1970-80)	115½	104½	105½	— 1
FORTH BRIDGE				
4% Deb.	109	103	99½	—
4% Guar.	105	102	95½	—
L.P.T.B.				
4½ "A"	133½	120½	122½	+ 1
5% "A"	142½	130½	131½	—
3% Guar. (1967-72)...	108	98½	98	— 2
5% "B"	128½	117½	117½	—
"C"	64½	56½	60½xd	—
MERSEY				
Ord.	34	30	32½	—
3% Perp. Pref. ...	76	69	69½	— 1
4% Perp. Deb. ...	117½	103	108	— 1
3% Perp. Deb. ...	98	81	90½	—
IRELAND*				
BELFAST & C.D.				
Ord.	8⅛	6	7½	—
G. NORTHERN				
Ord.	41⅞	30½	26	— 3
Pref.	63¾	52	46	—
Guar....	97½	78½	82½	— ½
Deb.	107	97½	98½	—
IRISH TRANSPORT				
Common	19/2½	16/9	14/3	+ 0/1½
3% Deb.	107	100	100½	+ ½

* Latest available quotation

OFFICIAL NOTICES

LONDON PASSENGER TRANSPORT BOARD. Applications are invited for the post of a temporary Engineering Assistant in the office of the Signal Engineer for the design section of the drawing office. Applicants should be not more than 30 years of age and should be in possession of a Higher National Certificate in Mechanical Engineering or an equivalent qualification. Their drawing office experience should include the design of electrical and mechanical components and jigs and tools. The appointment will be subject to a three months' probationary period, after which the probable duration of the employment will be two or three years. The commencing salary will be from £500 per annum, dependent upon qualifications, ability and experience. Applications giving particulars of experience, qualifications, present remuneration and age should be sent to the STAFF OFFICER (reference ER/E.443), LONDON PASSENGER TRANSPORT BOARD, 55, Broadway, S.W.1, so as to be received not later than September 12, 1947.

STEEL STRUCTURES purchased, dismantled and removed. Industrial steel structures re-built, re-roofed and renovated. Steel factory buildings dismantled, re-erected or adapted on other sites.—BELLMAN HANGARS LIMITED, Terminal House, Grosvenor Gardens, London, S.W.1. Sloane 5259.

4-8-2 CLASS "15F" LOCOMOTIVES FOR THE SOUTH AFRICAN RAILWAYS. The latest examples of these main-line passenger and freight locomotives have been built by the North British Locomotive Co. Ltd. Reprinted from *The Railway Gazette* of September 20, 1946. *Price* 2*s*. *By post* 2*s*. 2*d*.

TRAFFIC CONTROL ON THE L.M.S.R. Co-ordination of operating arrangements as a result of grouping.—Central, Divisional, and District Control—Outline of unified methods adopted—Organisation and working—Control telephone circuits—Daily telephonic conferences. Paper. 12 in. by 9 in. 20 pp. Illustrated. 5*s*. *By post* 5*s*. 2*d*.

His Majesty's Colonial Service
The Colonial Engineering Service

ASSISTANT ENGINEERS are required for the Railways and Ports Administration of Tanganyika Territory. Qualifications entitling applicants to consideration are Corporate Membership of the Institution of Civil Engineers, or Degrees or Diplomas recognised by that body as granting exemption from Parts A and B of its examination.

Candidates must be British subjects, physically fit, and preferably not more than 35 years of age. They should have had experience of civil engineering work as applied to railways, both construction and maintenance, but candidates lacking this experience may be considered if otherwise well-experienced in general civil engineering construction and if personally desirous of making a career in railway engineering. Appointed officers will be required to design, and supervise the construction and maintenance of, various types of buildings and structures, including wharf walls.

Appointments will be on probation for permanent and pensionable employment within an incremental salary scale which ranges from £450 to £840 per annum, point of entry depending on age, civil experience and length of approved war service. Free furnished quarters are provided and free passages for the officer and, if married, for his wife, on first appointment and on leave. Home leave on full pay is normally granted after tours of 30 months' service at the rate of 5 days for each month of resident service. Cost-of-living allowances at varying rates are at present payable and officers appointed on salaries of £600 or less are granted outfit allowances. Income tax at Tanganyika rates only.

The above salary scale is that within which the engineer would first be appointed, but good prospects exist, and will continue to exist, for promotion to posts entailing greater responsibility.

Intending candidates should write at once to the DIRECTOR OF RECRUITMENT (COLONIAL SERVICE), COLONIAL OFFICE, 15, Victoria Street, London, S.W.1, stating age, professional qualifications, and brief details of experience.

THE PORT OF LONDON AUTHORITY invite applications for the position of Deputy Chief Engineer. The salary will be by arrangement according to age and qualifications, but in any case the commencing salary will be not less than £2,000 per annum.

Candidates must be Chartered Civil Engineers, preferably under 45 years of age. They must have wide experience in responsible positions in dock and harbour construction and maintenance and should have mechanical engineering experience of dock and harbour plant.

The successful applicant will be required to become a member of the Port of London Authority's contributory superannuation scheme in accordance with the terms of the Port of London Act, 1928.

Applications in envelope marked "Deputy Chief Engineer," stating age, full details of training, qualifications and experience, and when available to take up appointment, should be sent to the GENERAL MANAGER, PORT OF LONDON AUTHORITY, Trinity Square, London, E.C.3, not later than October 31, 1947.

F. W. NUNNELEY,
Secretary

THE RAILWAY HANDBOOK provides the railway student with a collection of useful statistics and information relating to the railways of Great Britain and Ireland. In addition, in matters of international interest, such as speed and electrification progress, the book extends its scope to cover the whole world in order to present a complete picture of these increasingly-important developments. 120 pp. Dy. 8vo. Paper covers. *Price* 5*s*. *By post* 5*s*. 3*d*.

TRANSPORT ADMINISTRATION IN TROPICAL DEPENDENCIES. By George V. O. Bulkeley, C.B.E., M.I.Mech.E. With chapters on Finance, Accounting and Statistical Method. In collaboration with Ernest J. Smith, F.C.I.S., formerly Chief Accountant, Nigerian Government Railway. 190 pages Medium 8vo. Full cloth. *Price* 20*s*. *By post* 20*s*. 6*d*.

veyed by goods train, will cease to be dealt with at Murrow Station (L.N.E.R.), and instead will be catered for at Murrow Station (M. & G.N.). For the time being passenger trains are continuing to serve Murrow Station (L.N.E.R.).

Moulded Products Directors. — The board of National Plastics Limited announces that Mr. B. A. Ensell has been appointed Managing Director of Moulded Products Limited, and that Mr. N. D. Newall and Mr. H. P. Bridge have joined the board of Moulded Products.

Railway Accident Near Doncaster, L.N.E.R.—On Saturday last, an accident occurred at 4.45 p.m. on the L.N.E.R. main line south of Doncaster station. The 1.10 p.m. train from Kings Cross was standing awaiting the signal to draw into the station when the 1.25 p.m. express ran into the rear. The locomotive of the second train overturned, and a number of coaches were derailed. In all, 18 persons are stated to have died as a result of the accident; 74 were taken to hospital, of whom 45 were detained. The down main line was clear at 4 p.m. on Sunday, and the up main line an hour later. A Ministry of Transport inquiry into the circumstances of the accident, by Lt.-Colonel Sir Alan Mount, Chief Inspecting Officer of Railways, was arranged to be opened yesterday (Thursday).

Southern Railway Lecture & Debating Society.—The committee of the Southern Railway Lecture & Debating Society has arranged an extensive programme of lectures, debates, and visits for the 1947-48 season. The winter programme includes a debate with the G.W.R. Lecture & Debating Society at Paddington on December 11 on "Should First Class Travel be Abolished?"; a brains trust; a members' night, when short papers will be read by various members of the Society; and visits to the Eastern Extension of the Central Line, L.P.T.B.; Southampton Docks, and elsewhere. It is hoped also to arrange a visit to Ashford Works on October 11 in connection with the works centenary celebrations. The first winter lecture will be given on October 9 by Mr. J. L. Harrington, General Assistant to the General Manager, on "Cross-Channel Ships and Services." The Chairman of the committee for 1947-48 is Mr. J. A. R. Turner, Chief Civil Engineer's Department, Waterloo; and Mr. F. L. Back, Advertising Department, Cannon Street, is the Honorary Secretary. Information and publicity matters are being handled by Mr. R. A. Savill, London Central Divisional Superintendent's Office, Redhill.

Edgar Allen: Annual Meeting.—At the annual general meeting of Edgar Allen & Co. Ltd., whose report for the year ended March 31, 1947, was referred to briefly in our August 1 issue, Mr. W. H. Higginbotham, Chairman, said that the turnover for the year was equal to 160 per cent. of that for 1938, divided as to 24 per cent. steel, 20 per cent. tools, magnets, etc., 35 per cent. steel castings, and 21 per cent. engineering, including trackwork. During the past twelve years, some £351,000 had been set aside for depreciation of fixed assets, and a corresponding sum had been expended in replacements and extensions.

G. D. Peters & Co. Ltd.—A statement by Lord Inverforth, Chairman of G. D. Peters & Co. Ltd., circulated at the recent general meeting of the company, described the results for the year ended December 31, 1946, as satisfactory, although the company's activities were hampered by shortages of labour and materials, and production had been stopped entirely for three weeks by the fuel crisis. In addition, they were faced with steadily rising costs, and the Chairman felt that the time could not be far distant when it might cease to be possible, particularly in the export market, to pass on these increases to their customers. The accounts for the year showed a balance of £82,574, after charging all expenses and depreciation, but before making provision for taxation. A final dividend of 7½ per cent., with a cash bonus of 2½ per cent., was declared, bringing the total distribution for the year up to 17½ per cent. After making these appropriations there remained a balance to be carried forward of £43,691, as compared with £38,735 brought in.

Nitrate Railways Co. Ltd.—Although higher rates were in force during 1946, they sufficed only to meet additional wages expenditure, and the year ended with a loss of £57,748, as against £52,751. Gross receipts rose from £204,421 to £228,874, but expenditure, at £286,622 (an increase of £29,450) represented 125·23 per cent. of earnings. After deducting loss on working, the net revenue account shows an available balance of £155,731. A dividend of 1½ per cent. on the ordinary and preferred converted ordinary shares will absorb £36,225, leaving £119,506 to be carried forward. Renewals reserve account has been increased by £10,836 to £230,077 by the sale of sundry stores and materials.

Coventry Gauge & Tool Co. Ltd.—At the annual general meeting of the Coventry Gauge & Tool Co. Ltd., the Chairman, Mr. Herbert H. Harley, said they hoped to hear a favourable report of the company's prospects in the South African market when their Managing Director, Mr. S. J. Harley, returned from his visit to that country. The balance of the profit and loss account for the year ended August 31, 1946, was £76,805, as against £47,461 in the previous year. Even allowing for the charging against profits last year of £21,732 for deferred repairs to buildings, the result for the year ended August 31, 1946, were better than those of the preceding year. The result of the capital issue made in August last year had been to increase greatly the company's financial strength, and the total reserves now amounted to £279,302. In addition, £80,768 had been reserved as provision for deferred repairs to building and plant.

Railway Stock Market

Business in stock markets had dwindled to its lowest level for two years, reflecting talk of the possibility of big political changes and apprehension as to how the Government will use its wide powers under the crisis legislation. Industrial shares were inclined to attract attention as a "hedge" against inflation which it is feared may be stimulated when the supply of goods is reduced drastically by the cutting of dollar imports to a minimum. Later, however, prices were inclined to react, British Funds moving lower on the failure of the Leicester Corporation conversion—no less than 92 per cent. of the new 2½ per cent. stock (1965-70) will have to be taken up by the National Debt Commissioners.

Iron and steels came in for attention because of the industry's increased production target, and shares of many leading companies which yield up to 7½ per cent. were favoured on the view that there seem good prospects of dividends being maintained. Subsequently, however, earlier gains in Dorman Long, United Steel, Stewarts and Lloyds, Guest Keen and others in this section were not fully held. Sentiment again came under the influence of the assumption that despite the existing economic crisis the Government has not shelved plans for iron and steel nationalisation. Moreover, sentiment was also affected by Mr. Morrison's statement that under the crisis legislation the Government could take powers to "deal with" individual iron and steel undertakings. Heavy engineering and kindred shares were relatively steady because they are generally regarded as being outside the threat of nationalisation. Babcock & Wilcox held virtually all an earlier rise, and locomotive engineering and kindred shares have been prominent. Charles Roberts rose strongly to £5¾ in response to the financial results, Birmingham Railway Carriage & Wagon shares moved up to 41s. 3d. and Gloucester Wagon advanced to 62s. on current market dividend estimates.

Wider recognition of the attractions of home railway stocks, reference to which has been made in these notes on innumerable occasions, has at least resulted in increased demand. Much of the buying was again institutional, based on calculations of the extent of the capital appreciation that can be expected between now and the exchange into British Transport stock. Result of the Leicester Corporation conversion has emphasised the unpopularity of 2½ per cent. long-dated stocks, which is understandable with British Funds on their present basis, nearly 3 per cent yields being shown by 2½ per cent. Consols and 2½ per cent. Treasury Bonds at current prices.

In the circumstances it is hardly surprising the assumption is growing that British Transport stock (which is to be a long-dated security) cannot carry interest at less than 3 per cent. It has to be remembered, of course, that as in most other directions, the outlook will depend essentially on the extent to which the Government's plans overcome the crisis. Should the position become still worse and necessitate another Budget in the autumn, gilt-edged stocks and all other classes of securities might very well move considerably lower in price. On the other hand, should the economic position be eased without undue dislocation and a fresh dose of controls and austerities, it is possible, gilt-edged stocks might rally and receive official support. Consequently it cannot be taken for granted that growing hopes of a 3 per cent. rate of interest on British Transport stock will be realised. If it is at all possible the Government will not want to give more than 2½ per cent., because the rate of interest will have an important bearing on the financial results of nationalised transport. It has to be borne in mind that the Transport Act stipulates that the terms of British Transport stock have to be determined by the position of gilt-edged at the time of issue.

Welcome as has been the rally in home rails, the gains which on balance ranged up to two points, are moderate in relation to the extent that existing prices are below the "take-over" levels. Great Western ordinary, for instance, is now 54½, compared with the take over of 59 1/16, and the 5 per cent. preference at 114 is no less than 11 3/16 below the 125 3/16 take over. The home rail rally has been widely spread and extended to London Transport "C" which improved to 61 (take over is 67 3/16). Preference stocks tended to attract more attention than ordinary or equity stocks, although the latter, besides their investment merits, also have speculative attractions, because the final dividends on these junior stocks have possibilities of a number of pleasant surprises. Argentine rails were firm and moving higher, particularly debenture stocks, which are likely to receive their share-out money at the end of October. Central Argentine notes rose 4 points to 118. Leopoldina and other Brazilian rails were higher on balance, although best levels were not held. White Pass & Yukon 5 per cent. debentures continued to be quoted at 120.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ended	Traffic for week: Total this year	Traffic for week: Inc. or dec. compared with 1945/46	No. of Week	Aggregate traffics to date: Totals 1946/7	Aggregate traffics to date: Totals 1945/6	Aggregate traffics to date: Increase or decrease	Shares or Stock	Prices: Highest 1946	Prices: Lowest 1946	Prices: Aug. 12, 1947
				£	£		£	£	£				
South & Central America	Antofagasta	834	3.8.47	53,120	+ 17,430	31	1,255,260	998,130	+ 257,130	Ord. Stk.	11	10¼	11
	Arg. N.E.	753	2.8.47	ps.321,400	−ps. 1,100	5	ps.1,505,800	ps.1,570,100	− ps.64,300	,,	17	5	11
	Bolivar	174	July, 1947	$98,317	− $9,349	30	$773,180	$760,024	+ $13,156	6 p.c. Deb.	6½	5¼	16½
	Brazil	—	—	—	—	—	—	—	—	Bonds	30	26	31½
	B.A. Pacific	2,771	19.7.47	ps.2,450,000	+ps.200,000	3	ps.6,275,000	ps.6,488,000	− ps.213,000	Ord. Stk.	8¼	5¼	11
	B.A.G.S.	5,080	2.8.47	ps.3,360,000	+ps.441,000	5	ps.16,366,000	ps.16,752,000	− ps.386,000	Ord. Stk.	16	10¼	17½
	B.A. Western	1,924	2.8.47	ps.1,395,000	+ps.256,000	5	ps.6,342,000	ps.5,716,000	+ ps.626,000	,,	19	9¼	22½
	Cent. Argentine	3,700	2.8.47	ps.3,429,180	+ps.337,680	5	ps.15,227,035	ps.15,364,115	− ps.137,080	,,	10½	7¼	18½
	Do.	—	—	—	—	—	—	—	—	Dfd.	6	4¼	14
	Cent. Uruguay	970	2.8.47	31,187	− 6,368	5	162,695	180,482	− 17,787	Ord. Stk.	8¼	3¼	19½
	Costa Rica	262	Apr., 1947	33,865	− 83	44	286,765	286,820	− 55	Stk.	15	12	10½
	Dorada	70	June, 1947	29,200	− 6,400	26	179,800	186,275	− 6,475	1 Mt. Deb.	102½	99¼	108
	Entre Rios	808	2.8.47	ps.450,700	+ps.25,800	5	ps.2,016,300	ps.2,105,400	− ps. 89,100	Ord. Stk.	9	5¼	11
	G.W. of Brazil	1,030	3.8.47	27,200	+ 4,000	31	986,700	856,600	+ 130,100	Ord. Stk.	26/6	20/−	31½
	Inter. Ctl. Amer.	794	June, 1947	$1,002,064	+ $199,162	26	$6,902,843	$5,657,516	+ $1,245,327	—	—	—	—
	La Guaira	22¼	July, 1947	$100,778	− $27,921	30	$785,160	$822,241	− $37,081	5 p.c. Deb.	70	58	86
	Leopoldina	1,918	2.8.47	75,644	+ 10,267	31	2,012,041	1,742,061	+ 269,980	Ord. Stk.	5	3¼	13
	Mexican	483	31.5.47	ps.1,464,000	+ps.459,100	22	ps.7,706,200	ps.13,441,600	+ ps.5,220,000	Ord. Stk.	1¼	¾	¾
	Midland Uruguay	319	June, 1947	17,386	− 2,592	52	203,575	224,254	− 20,679	—	—	—	—
	Nitrate	382	31.7.47	8,855	+ 111	30	135,055	128,031	+ 7,024	Ord. Sh.	83/9	71/3	75/-
	N.W. of Uruguay	113	June, 1947	5,359	+ 304	52	67,160	66,419	+ 741	—	—	—	—
	Paraguay Cent.	274	25.7.47	₲75,097	+ ₲15,672	4	₲202,849	₲228,044	− ₲25,195	Pr.Li.Stk.	78½	60	44½
	Peru Corp.	1,059	July, 1947	162,690	+ 11,788	4	162,690	150,902	+ 11,788	Pref.	16½	8¾	9½
	Salvador	100	Apr., 1947	c145,000	+ c6,300	44	c1,483,000	c1,393,700	+ c89,300	—	—	—	—
	San Paulo	153½	—	—	—	—	—	—	—	Ord. Stk.	119½	52½	158½
	Taltal	156	July, 1947	5,585	+ 1,790	4	5,585	3,795	+ 1,790	Ord. Sh.	22/6	15/3	18/-
	United of Havana	1,301	2.8.47	57,414	+ 2,520	5	293,683	274,032	+ 19,651	Ord. Stk.	2	1¾	2
	Uruguay Northern	73	June, 1947	1,176	− 43	52	16,681	20,642	− 3,961	—	—	—	—
Canada	Canadian National	23,535	June, 1947	9,348,000	+1,447,250	26	53,060,250	46,539,250	+ 6,521,000	—	—	—	—
	Canadian Pacific	17,037	7.8.47	6,041,000	+ 568,000	31	184,587,000	168,983,000	+ 15,604,000	Ord. Stk.	25½	16¾	17½
Various	Barsi Light†	202	June, 1947	28,365	+ 9,435	13	80,235	73,395	+ 6,840	Ord. Stk.	123½	111	111
	Beira	204	Apr., 1947	80,157	+ 4,547	29	624,106	508,964	+ 115,142	—	—	—	—
	Egyptian Delta	607	20.8.47	16,791	− 887	15	179,814	181,642	− 1,728	Prf. Sh.	9¼	5	6½
	Manila	—	—	—	—	—	—	—	—	B. Deb.	75	60	72½
	Mid. of W. Australia	277	June, 1947	16,351	− 329	52	202,351	208,970	− 6,619	Inc. Deb.	85	70	75
	Nigeria	1,900	May, 1947	376,824	− 32,267	9	731,208	761,991	− 30,783	—	—	—	—
	Rhodesia	2,445	May, 1947	591,473	+ 42,592	33	4,408,697	4,066,790	+ 341,907	—	—	—	—
	South African	13,323	12.7.47	1,237,327	+ 12,149	15	18,244,165	16,098,260	+ 2,145,905	—	—	—	—
	Victoria	4,774	Apr., 1947	776,548	− 411,075	43	—	—	—	—	—	—	—

† Receipts are calculated @ 1s. 6d. to the rupee